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IMPROVED PNEUMATIC PUMP.

There are perhaps few machines that mechanics have endeavored to improve upon more than a pump for compressing air, or gaseous matter. Various experiments have been made, many of which have proved failures, and a few partially succeeded. Various forms of pumps have been tried, from the common single action, to the more complicated telescopic cylinder. Among the difficulties to be surmounted, may be mentioned, the great amount of friction on the piston, caused by its being necessarily tightly packed to prevent leakage; and the heat consequent upon such packing also extending to the cylinder and valves, making it necessary in many instances to submerge the pump in water to prevent heating. In the pump shown in the illustration, it has been the object of the inventor to provide against these difficulties—and this he claims to have done by using a "*water packing*," or, in other words, by submerging the piston, valves and working parts of the pump in water or other liquid, which prevents the air or gas from coming in contact with the piston, and also keeps the pump from heating. B is the main pumping cylinder—F, F are two upright conical chambers, connecting with and opening from the horizontal cylinder B, at the base of which the inlet valves, E, E are placed in appropriate water departments. The chambers K, K, connect with chambers F, F, and contain the valve seats J, J, having openings at H, leading outward. G, G are the outlet valves. I is a reservoir to receive the air, or other gaseous bodies being pumped, and also any liquid that may be ejected from the upright chambers F, F. Connected with I, by means of pipe, M, is the regulator, which is a metal circular cylinder (inside of which is the oscillating valve, N) with ports opening to M, to connect with I; and with the upright chambers F, of the pump, at P, P, having also ports opening inward, to the valve N, at *a* and *o*. Inside of the valve N, is a hollow cylinder B, open at both ends, containing a ball, c, which acts both as valve and piston. The operation is as follows: As the piston, C, moves in the direction indicated by the arrow, the liquid is forced up in one of the upright chambers, as shown in figure 2, expelling all of its gaseous content through valve J, and pipe H to I, and from thence to any point desired. At the same time the liquid recedes from the other upright chamber, creating a vacuum, which is supplied by the air or gas passing through inlet valve E, filling the chamber. When the piston has traveled almost the extent of its stroke, the cross head, by a proper mechanical arrangement, shown in figure 1, moves the working part of the regulator, and delivers a charge of water to the chamber F, in which there is little or no pressure. This is to provide a sufficient supply in the pump, so that every space and crevice will be filled; and the surplus liquid being ejected at every stroke, prevents any air or gas remaining in the chambers. In the reverse movements of the piston the operation is, of course, the same, the valves being raised by one movement of the piston, and closed during the other. There are a great variety of purposes for which air pumps are applicable. Among them may be mentioned, mining and tunneling operations, affording ventilation at the same time in submarine drilling, gas works, ærated bread bakeries, working in oil wells, and for metallurgical purposes. In sugar houses, oil refineries, milk-condensing establishments, ice factories, condensing steam engines, and all other places where vacuums are required, these pumps can be used by arranging the valves and other parts for the purpose desired. In connection with this description it may be mentioned that Messrs. HOY KENNEDY & Co., of the New Castle Iron Works, are now constructing one of these pumps of a large size, for the New Oxygen Gas Works in New York City, in which a pressure of from 300 to 500 pounds per square inch will be required. These pumps are manufactured and sold by Messrs. FRYER BROTHERS & Co., Nos. 8 and 10 Wall St., Room 43, New York City, to whom all orders should be addressed.

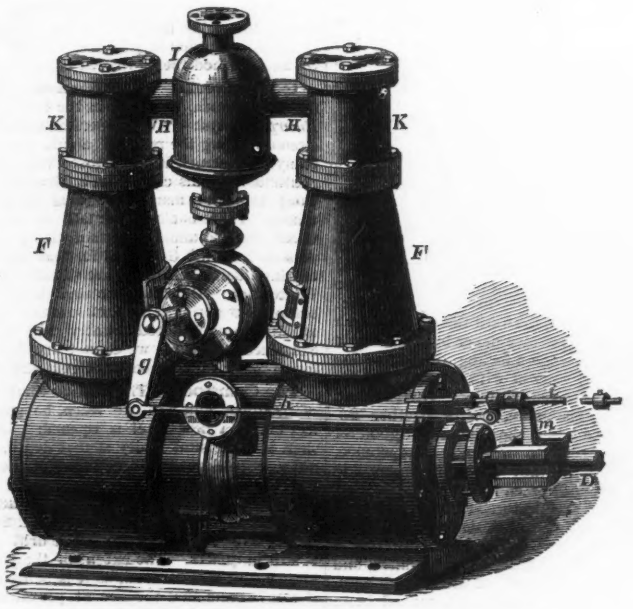

Fig. 1.

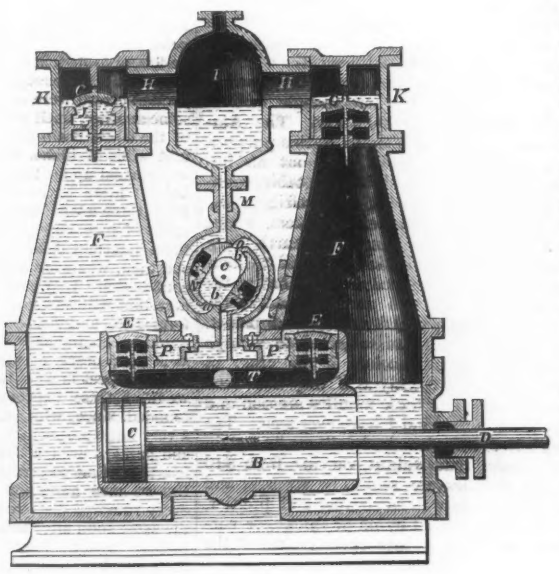

Fig. 2.

FRYER'S IMPROVED PNEUMATIC PUMP.

Improvements in Iron-Making.

THE present generation of ironmasters have only to look back to the days of their fathers to recall the then prevailing disbelief in the hot blast. And they have to look back but a very few years indeed to the time when close topped blast furnaces were thought, if not impracticable, as at least worse than useless and positively dangerous. It is even since the growth of Cleveland, now hardly fifteen years old, yet producing one-fourth of all the pig iron made yearly, in the kingdom—that this signal reform has been effected in so many districts, for it is not even yet carried out in all. The attempt to heat the blast to 1000° or 1200°, was not so long ago regarded as preposterous, for it was said the heating stoves could not stand it for twenty-four hours together. Even Schneider, Hannay, and Co.'s furnaces of 9000 cubic feet capacity were regarded, at the time of the Exhibition of 1862, as far too large for general practice; but now furnaces of from 20,000 to 30,000 cubic feet are doing well in North Yorkshire and South Durham. It is impossible to define the limits of improvement in the manufacture of iron, but it *is* possible to define further means of improvement. It is a most vicious custom with all ironmasters in England to charge their iron-stone in lumps of considerable size to the blast furnace. There is a pretence of breaking up the stone, and in South Wales this is done by *girls*, wielding hand picks, after the manner of paupers breaking road metalling. In Sweden, the excellent ores of that country are crushed by machinery to the size of half inch cubes. It is not necessary in order to lower the temperature of the gases of the furnace, to carry it 60 ft., 80 ft., or even 100 ft. high, as is now done in Cleveland. Only give the stone "a chance" by developing its heat absorbing surface, and a ton of stone broken into half inch cubes presents eight times the surface which it would if broken only into 3 in. cubes. It is only the incalculable extent of interstitial heat absorbing surface which fluid melted iron possesses that permits of its being converted in a few minutes into steel by blowing air through it from the bottom upwards. We cannot conceive the magnitude of a single indivisible particle of iron, but supposing, for the sake of bringing it within the compass of the mind, that it was a cube one sixty-fourth of an inch square. We know that it is almost infinitely smaller, since it is perfectly easy to detect the presence of a single grain of iron in a hundred gallons of water. But taking the imaginary cube 1-64th inch on a side, and a 5 ton charge, say, 24 cubic feet of iron in a Bessemer converter, the iron lying 18 in. deep, equal to a block 4 ft. × 4 ft. × 1.5 ft = 24 cubic feet, and having a superfices of 56 square feet only. Divided into cubes of 1-64th in., the whole surface would become 110,592 square feet, or more than two acres and a half. In reality, the heated surface thus acted upon in 5 tons of melted iron is more probably many millions of acres. And the greater the heat absorbing surface the quicker the action of the hot gases rising among it. The only practicable means of breaking ironstone on the large scale, and at a low cost, is afforded by the use of Blake's stone breaker, an invention which, properly recognized and employed, would be of incalculable value to the iron industry of the kingdom. Even if it cost 4d. a ton to break the stone into small fragments — and the cost is not more — and taking this as 1s. a ton on the pig, the saving of coke, by lowering the temperature of the escaping gases, would in most districts be much greater, while the height of the furnace might be lessened with a consequent saving in first cost, interest, and repairs, besides the saving in hoisting, say, 5 tons of materials for each ton of pigs, through the additional height saved. Of Aitken's mode of calcining iron-stone in close kilns, especially the carbonaceous stones, much may be said, and we shall have more to say hereafter.—*Engineering.*

About Slate.

A circular issued by Mr. Baldwin, a quarry owner in Amherst, Virginia, contains some condensed facts about slate, that may interest the general reader. As to whether the writer is sanguine or somewhat partial in his statements we leave our well-informed readers to decide. Says Mr. Baldwin:—

"The largest and most numerous Slate quarries and factories in the U. S. are situated in the Lehigh valley, in Northeastern Pennsylvania, about 75 miles North of Philadelphia, and 100 West of New York. Slatington, on the Lehigh, a bright and beautiful town, nearly as large as Lexington, has been built up within the last few years, exclusively by the slate establishments in its vicinity. Within a radius of 25 miles from that centre, there are probably fifty slate quarries and factories, giving employment to hundreds of hands and thousands of capital, and creating an annual product of the value of several millions. A *good slate* quarry, with a few acres of land, sells there at from twenty-five to seventy-five thousand dollars. One was recently sold at $85,000: and another, a very large and superior one, just above the depot at Slatington, was held at upwards of $100,000. Some of the quarries and factories are from six to twelve miles from the railroad, and haul all their slate there in two-horse wagons. The estimated annual product of these quarries in roofing slate, is from 150,000 to 200,000 squares. It sells and pays at seven dollars a square, delivered on the cars. In Philadelphia and New York, it is about two dollars higher. The cost of putting on slate-roofing is about dolla- and a half a

square in the country, and from two to three dollars in the cities. The Buckingham Slate Company recently charged Washington College sixteen and a half dollars a square, for roofing the College Chapel, and fifteen dollars for roofing Gen. Lee's house, with their very superior slate. The roofing costs fifteen dollars and shingle roofing seven dollars a square in Lexington. All the houses in that highly cultivated section of Pennsylvania—in the country as well as in the towns—barns, stables and corn-cribs, as well as factories, dwellings, and churches—are roofed with metal or slate—ninety-nine in a hundred with slate, which is there considered cheaper than shingles. In Allentown, with a population of 10,000, I did not observe a single shingled house of any kind. Shingles have naturally enough *gone up there*. Through the North and West, slate is rapidly superceding all other kinds of roofing, on all buildings which do not require flat roofs. It costs but little more than the first quality of cyprus shingles, while it is fire-proof and lasts for ages. There are regular slate-houses in Chicago, Cincinnati and St. Louis, as well as in Baltimore, New York and Boston, and in all the cities on our Atlantic coast. Nearly all the school-slates used in the U. S. are made in the Lehigh valley. The slates are cut out with great rapidity, with six-inch circular saws, propelled by steam or water, and are smoothed off by hand with a short and thick drawing knife, called a slate-scraper. One hand will cut out a 1,000 in a day, and another will smooth off 500. The frames are all made by machinery of seasoned cherry plank, and cost about two cents each. School-slates and all manufactured work pay better than roofing and flagging. There is not, to my knowledge, a single manufactory of school-slates in the entire South. This great deficiency can, I think, be supplied from the Amherst quarries, where good school-slates have already been made from surface material, by unskilled workmen, with no other tools than their pocket-knives. They can be produced there, I am satisfied, 25 per cent. cheaper than in the Lehigh valley.

"The number of school slates made near Slatington is immense, and the demand for them is constantly increasing with our rapidly increasing population. (I hope to make a contract with the Freedman's Bureau for half a million or so of slates, for the fragrant and grinning young Sambos of the South, to work fluxions and square the circle on). The slates are packed in neat cases and consigned to the wholesale houses in large cities, which distribute them all over the country. Slate pencils, as far as I have been able to learn, are made in the United States only in Vermont, where a single factory, it is said, turns out by machinery 100,000 a day. The Amherst slate has proved itself well adapted to this purpose. Besides school slates, the Lehigh factories send out an immense number of mantle-pieces, billiard, bureau, table, counter and wash-stand tops, foot and bathing tubs, refrigerators chess and backgammon boards, brackets, registers, sinks, etc. Even coffins, which will last as long as the earth itself, are now made of slate, which is almost daily applied to some new purpose. The mantles are shaped and polished at the factories by expensive machinery, and are then sent to the cities, where they are elaborately painted with mineral paints, in imitation of the antique marbles, and subjected to a high heat, which transfuses and infixes the colors in the grain of the slate as thoroughly and permanently as if they had been painted by nature itself. Some of these mantles are rich and gorgeous beyond anything of the kind I have ever seen. The best of them sell from two to three hundred dollars. The plain mantles are not much dearer than walnut, varying from $10 upwards. These slate mantles are said to be stronger and more durable than marble, as well as cheaper and prettier, and not liable, like it, to be stained by oil or smoke, or corroded by acids. They are coming into extensive use at the North.

"Slate is of many varieties—argillaceous or clay, like the Lehigh or Amherst slates—the best for economical purposes—talcose, like the soft slates of Albemarle, which are unsuitable for roofing—micacious, which are fire-proof, etc. Many large beds of slate, "so-called," are found in Rockbridge, but being deficient in the oxide of iron, which composes 10 or 12 per cent. of good roofing slate, they want durability, and soon crumble into shale when exposed to the weather. They are good for nothing for working purposes. Slate is of many colors—grey, blue, black, greeen, red and purple, with all intermediate shades. The red and green slates, which are considerably used in the North for churches and other fancy buildings, come from Vermont. They sell at $13 a square in New York. Good slate lies in the earth, in all positions, from horizontal to vertical. It is often found in narrow veins between other rocks. Working slate is rarely if ever found nearer the surface than from ten to thirty feet, and generally gets firmer as you go deeper. Some of the old quarries are several hundred feet deep, and have to employ expensive steam engines to pump the water. I saw only one quarry at Slatington having natural drainage. A steam engine costs nearly a thousand dollars a year to run it. Slate is quarried by blasting with light charges of powder. It is then hammered into square or oblong blocks with heavy and sharp stone axes, and split into thin sheets with broad and thin steel chisels, while green and fresh from the quarry. It won t work when dry. A set of four miners—two quarrymen, one dresser and one splitter—called a "block"—will get out about ten squares a day, in a first-class quarry. It is sometimes got out by contract by the square. The only contract of this kind I heard of was at two dollars and a half a square. Roofing is cut rapidly in any form, plain and fancy, by laying the sheet-slate on an iron frame and striking it along the side of the iron bar with heavy and sharp steel knives. It cuts like old cheese. All the slate miners in the United States are foreigners, mostly Welshmen, who speak the Welsh language and imperfect English. The wages are too high, ranging from three to four dollars a day. Unskilled labor, lumber, fuel, provisions, house rent, and water-power are much lower here than in the Lehigh Valley, while our milder climate is far more favorable for quarrying, hauling, and all out-door operations. Some of the Lehigh slate quarries and factories are conducted by individual owners, some by leases, and the larger ones by partnerships and incorporated companies. The leases of unimproved quarries are on all sorts of terms and conditions, and run from 10 to 99 years. The royalty ranges from 25 cents to a dollar a *ton*, making three squares of roofing slate. A few of the best establishments pay an annual profit of from 30 to 50 per cent., but this is much above the general average. The Buckingham (Va.) Slate Company, composed of efficient Northern men, working a single narrow and deep quarry, kept dry by a steam engine, and hauling their slate in wagons four miles to the canal, have recently declared a dividend of 12 per cent. foor the last year on a capital (if I am correctly informed) of forty or fifty thousand dollars, after making valuable improvements on their property, paying their officials liberal salaries, retaining $3,000 to purchase a new engine, and having on hand 3,000 squares (upwards of $25,000 worth) of roofing, which they are exporting to New York and Boston—a result showing admirable management and very large profits. The Buckingham Company make nothing but roofing and flagging, and, indeed, if I am rightly informed, can make scarcely anything else out of their hard metallic slate; while the Amherst slate seems to be well adapted to roofing, school slates, mantles, and all other economical purposes for which slate is now used."

Mining Summary.

GOLD AND SILVER.

Nevada.

White Pine.—Undoubtedly many readers of the JOURNAL OF MINING intend to be present in White Pine ere the opening of Spring. To such, some account of those who are wintering there, and are destined to become companions, will be of considerable interest. The White Pine *News* thus reviews:

"WHO WE HAVE HERE, AND THEIR PROSPECTS."

"It is surprising to observe how large a proportion of the inhabitants of White Pine is composed of that class of prospectors and adventurers who have been following up every mining excitement that has occurred on this coast for the past twelve years. Three-fourths of our population consist of men who have ever held themselves ready to pack up and be off on the first rumor of mining discoveries made at some distant point; and who, notwithstanding their oft-repeated disappointments, are as ready to-day to start out on a "big thing" being announced as they were when they first entered upon these fruitless crusades. One sees here the same man with whom he traveled to Kern River, and afterwards to Frazer, and with whom he finally brought up on the Comstock lead, in Washoe; where, there not being enough of that mine to "go round," the expectant crowd were obliged to scatter; some going one way and some another, until nearly every mountain range in the vicinity of the Great Basin had been explored; and even the more distant wilds of Idaho, Montana and Arizona had been prospected and opened up for the occupancy of a less daring race by the labors of these brave and hardy men. Having heard of White Pine, these adventurers, still animated by a strong will and the spirit of true enterprise, have gathered in here; the most of them determined, as they express it, to 'take one more chance,' and then, whatever the result, to have done with mining; so confident are they that they shall be able to make a 'strike' here that will set them on their feet and reward them for all their former toil and disappointment. We have never before been in a mining community pervaded by such a feeling of satisfaction as is this; nearly everybody being content with what they have got or expect in a short time to be able to get. And, indeed, we think these expectations, in the main, not altogether unfounded, since, with patience and labor, the chances are good for a very large proportion of those here to realize a competence, and perhaps even a fortune, should they devote a reasonable length of time to earnest and well-directed labor in this district. But we have here, not only the prospector, striking out after every rumored discovery, and forming new districts, to abandon the same soon after and go in search of something better a little further on—but the millman, the capitalist, the speculator, and the ancient 'mining sharp'—the old crowd of idlers and bummers, a little thinned out, yet essentially the same, are all here, and all but the idler eager to re-enact the role performed by them in Virginia, Austin and a dozen other places. And thus, with a sprinkling of other elements, is our community made up, the whole being animated by an abiding confidence and a reckless energy that can hardly fail to lead to a speedy development of our mines and result in very general success in the end.". . . . The following are the prices at which leading commodities are retailing at Treasure City—the rates at which bulky articles, such as lumber, hay, wood, etc., sell in Hamilton and Shermantown, being somewhat less: Hay, $200 per ton; lumber, $275 to $300 per thousand feet; flour, $18 per hundred pounds; bacon, 40 cents per pound; beans, 25 cents; sugar, 40 cents; butter, 75 cents to $1; potatoes, 14 cents; onions, 25 cents; barley, 12 cents; syrup, 5-gallon kegs, $14; drilling, 25 cents per yard; charcoal, 75 cents per bushel; wood, $20 per cord; water, 7 to 10 cents per gallon. In the neighboring villages, water costs nothing; wood, in Shermantown, $8, and in Hamilton, $12 per cord. Lodging, in bunks, is uniformly $1 per night; meals, one dollar each; board, twelve to fifteen dollars per week; fresh beef, of excellent quality, 15 to 25 cents per pound; mutton, 20 cents per pound. fresh pork, 40 to 50 cents; eggs, $2 per dozen. Heavy California blankets sell at $12 per pair. Most kinds of dry goods, fuse, powder, hardware, etc., sell at but a moderate advance on Austin prices. Laborers are generally receiving six dollars per day. . . . It is probable that the important comodity, water, which is quoted above at from 7 to 10 cents per gallon, will, at an early day, be supplied to Treasure City and Hamilton at a cost much less. The *News* says, in this connection: "We understand that Colonel D. W. Von Schmidt, well known as the constructing engineer of several important public works in and around San Francisco, and who has been spending a week or two in this vicinity, has purchased from those claiming it, the franchise for all the water of Illapah Creek, with a view to introducing it into Hamilton and Treasure City. Further than that, the plan involves the employment of two stationary engines for lifting the water to the top of Mokomoke Hill, where a reservoir is to be built for its reception, and whence it is to be distributed in pipes. We are not informed as to the details of the scheme. Colonel Von Schmidt, who has had a large experience in the construction of water works, pronounces this enterprise entirely feasible, as well as likely to prove highly remunerative to the parties proposing to undertake it; and will so report to the latter on his return to San Francisco, whither he has gone, with a view to expediting measures preliminary to its early inauguration. Should this project be carried out, as it now seems likely to be, it will greatly add to the value and security of property in this town, besides reducing the cost of living, while it increases largely the health and comfort of the inhabitants."

White Pine.—The White Pine *News* gives the returns of the Oasis Mill upon ore from some of the principal mines of this district. As some suppose that the Eberhardt is the only paying mine in the district, we give below a list of the names of the mines from which lots of ore have been tested:

Name of Mine.	Pounds of ore.	Rates per ton.
Aurora South	473,952	$169 57
Robert Emmet	120,000	380 00
California	3,036	339 57
Emersley	7,074	443 00
Hudson & Logan	6,030	601 61
Hidden Treasure	50,297	341 69
Last Chance	12,160	302 07
Montgomery	932	1,614 36
Romulus	6,000	491 67
Snow Drop	6,909	347 14
Stonewall	25,067	421 76

Another mill is on the way to White Pine. The *Reveille* thus tells of it:—"We heard yesterday that a number of teamsters was engaged to haul the machinery and building of the Big Smoky Mill, situated at the mouth of Geneva Canyon, about 14 miles from Austin, to the District of White Pine, where it is to be rebuilt, we believe, at Silver Springs. The mill was purchased by J. W. Bailey, formerly superintendent of the Centenary Company, in the District of Newark. The Big Smoky Mill is of the capacity of 20 stamps, and adapted to wet crushing. It was completed last spring, and closed after a week's trial of the ore from the Big Smoky Ledge, which was pronounced 'bilk' by the man who recommended and superintended the building of the mill. The machinery is new and in good condition, and it may prove a valuable accession to the reduction works of White Pine."

Palmetto.—The Virginia City *Enterprise*, January 7th, notices the shipments by the Silver Peak and New York Company, operating in this district, of 600 pounds of bullion, their first product from their new 16-stamp-mill, upon ore from the Silver Champion Vein, and adds that the "company have commenced mining on a very extensive scale. We are informed that they already have employed at their mill and mine some 200 men, that they now have out a great amount of ore equally as rich as that crushed, and that they will shortly increase the crushing capacity of their works. They expect soon to send in a second and much larger shipment of bullion.". . . . Of the operations of other companies, our cotemporary says:—"The Virginia and Gold Hill Water Company, of this city, are interested in and are engaged in prospecting several leads in Palmetto District, which assay very high in silver. In the district are now in operation 12 roasting furnaces, working argentiferous galena ores. In the lower hills of the Palmetto Range, near Fish Lake Valley, are some very promising veins of gold-bearing quartz. One of these, the Double Eagle, a vein about two feet in width, is exceedingly rich in gold; one ton of the rock hauled to Austin and crushed there, yielded $1,615."

Goose Creek.—We have rumors of another mining excitement in Nevada, this time in the Goose Creek Mountains. The *Enterprise* says:—"We understand that there is considerable excitement along the railroad about some new mines that have lately been struck in the Goose Creek Mountains. A letter to a gentleman in this city, from a friend in Truckee (Coburn's Station) states that many are going from that place to the new mines. There is also some talk about a place called McCan's Creek, and we understand that within the past three days several persons have left Gold Hill for that region. The mines are silver-bearing quartz veins, and are situated about 150 miles north of White Pine. Doubtless we shall hear of many new discoveries before next spring, and next summer thousands of square miles of hitherto unexplored country will be overrun and carefully examined, resulting, we cannot but feel convinced, in the finding of many valuable leads of gold and silver-bearing quartz."

The Comstock.—The Bullion Shaft has now attained a depth of 1,300 feet, and will, we learn, be sunk to the depth of 1,400 feet before a new level is opened. The ground in which the shaft is being sunk is dry at that depth, and the chances are that not a drop of water will be found at the depth of 1,400 feet. . . . The Hale & Norcross Co. have struck some very good ore at the lower or 1,030-foot level. It lies next to the East Clay Wall, and is a very promising streak of ore, five or six feet wide, and paying over $50 to the ton. The drift after passing through it is still in quartz. The extent of the pay streak is not at present known, but will be soon, as it is being drifted upon. From this it would seem that the recent prevalent rumor that the ledge had been entirely drifted through, was a mistaken idea. This newly-developed streak runs in more of a northeasterly and southwesterly direction than the established course of the ledge, and this course would apparently carry it to the west of the Chollar Potosi Shaft. Finding a body of such good ore at that depth is most certainly a very encouraging circumstance to all the mines in that vicinity, as well as the rest of the ledge.

Bullion Products and Shipments.—Wells, Fargo & Co. shipped from their office in Treasure City, White Pine, direct to San Francisco, during the month of December, bullion to the amount of $61,835 22. So says the *News*. . . . An abstract of the official statement of the bullion produced by the Manhattan Mill, during the year 1868, reads as follows in the *Reveille*:—"The number of tons of ore reduced amount to 5,393, which yielded bullion valued at $1,196,019 86. During the year the mill ran 315 days. It has 20 stamps, but it lacked the proper complement of furnaces up to the 4th of May, at which date two more had been added, since which period the full capacity of the mill has been employed.". . . . The bank of John A. Paxton & Co., in Austin, shipped bullion valued at $1,070,727 16 during the year 1868.

California.

From the annual review of mining in California for the past year, published in the San Francisco *Alta California*, we take the subjoined facts:—"The weather in 1868 was favorable to mining. The supply of water was considerably above the average, and there was no extraordinary frost or flood to interrupt work in either the quartz or gravel mines. In quartz there was little change. The mines which occupied a leading position in 1867 have it still, notwithstanding some variations. No great mine has fallen, nor has any new one risen. The Eureka, at Grass Valley, extracted about 18,000 tons of ore and paid $280,000 of dividends last year, or an average of $23,500 per month. The Amador Mine, in fourteen months, ending on the 1st of December last, worked 28,311 tons and extracted $617,437, an average of $21 80 per ton. The dividends were $340,400, about $24,000 per month, or $12 02 per ton. The North Star, at Grass Valley, has produced $176,000 in the last six months; $60,000 have lately been expended in expensive and important improvements, so that, according to report, the mine is now in a better condition than ever to pay regular monthly dividends. The gross production of the Empire Mine is estimated at $240,000 for 1868. The Banner, at Nevada, produced $200,000 gross for the year. It turned out $44,000 in the last 60 days; but this was exceptional. The yield per ton is about $18, and the current monthly expenses about $9,000. The Sierra Buttes turned out $215,000 gross, an average of $14 50 per ton, and paid $138,000 dividends, an average of about $9 35 per ton. The Keystone Mine, Amador County, yielded $168,588 15 for the calendar year, the average per ton being about $16. The Quail Hill Mine, as worked during the early part of the year with stamps, did not pay expenses, though the tailings were rich in the assays, so a Howland's Rotary Crusher, which bears some resemblance to a big coffee mill, was

set up, and four tons were run through it daily, and then worked in two Wheeler pans. The result was that $35 were saved to the ton, and the tailings left from the old workings paid from $10 to $25—the latter sum having been obtained from the tailings nearest the mill. This experiment was tried for four months, and the success being considered certain, the mill is to be remodeled and the work resumed next spring. The Mariposa estate is in the hands of Mark Brumagim, J. A. Steward and J. J. McEwen, Trustees, who are now preparing to work the Josephine Mine. The dam across the Merced River is completed, and the mill will soon commence reducing by the Lundgren and Ryerson process on a larger scale than ever before. The miners are now taking out ore from the Josephine, and rumor says that it will yield at least $25 per ton, and that the amount in sight equally as good is considerable. The Bear Valley Mill, which was burned down in the summer, will not be rebuilt, having been in an unfavorable situation. A very rich lode, known as the Petticoat, near Mokelumne Hill, and several in Sierra Co., have been opened, but their productions has not been large as yet. Two quartz mills have been erected in the Soledad District, 30 miles from Los Angles, and the reports from them are favorable. In placer mining there has been a steady decline. The Chinese, who did most of the shallow mining a few years since, have been employed on the railroads in such numbers that the rivers and ravines have been neglected, but next summer many of them will get back to their old haunts. Several good hydraulic claims have been worked out, and others have been beset by difficulties of drainage, so that consolidation has been necessary. The Blue Gravel Mine, at Smartsville, still maintains its pre-eminence among the placer mines of the State. Its gross yield last year was about $200,000, of which probably 55 per cent. was net. A few days since, a blast of 15 tons of powder, the largest ever used for gold mining in this State, was let off in the Blue Point claims, at Sucker Flat, to loosen the gravel for hydraulic washing. Several large tail sluices were commenced last summer, but none of them have been finished."

Nevada County.—It is reported in Bridgeport township that several interests in mining ground near French Corral have been sold recently, and that a number of agents for San Francisco and Eastern capitalists are negotiating for the purchase of mines in that vicinity. The *Gazette* says:—"Stidger, Evans & Co., of the Buckeye claims, have given bonds to sell their grounds to an English Company for the sum of $225,000. Several other claims have been bargained for within a few days past, involving a large amount of money. A number of these mines, a few years ago, were considered as valueless, or worked out, and now their owners hold them at from ten to fifty thousand dollars each."..... The *Gazette* editor, while on a visit to the Eureka mine, near Grass Valley, collected from the Watt Brothers the following statistics for 1868:—"The crushing department of the mill has been increased from twenty to thirty stamps, and a Varney and Rix rock crusher, run by a sixteen horse-power engine, saving the labor of three men, and making a very marked difference in the capacity of the stamps—say an increase of nine tons in every twenty-four hours—has been added. Two forty horse-power engines are used for hoisting and pumping. One sixty horse power is used for the battery stamps. The mine is now being worked in levels, No's. 2, 4, and 5, the fifth having just been opened, and the ledge at this point will average about three and one half feet in width, and in depth is 563 feet perpendicular from the surface. This mine is worked with very long backs, say an average of 130 feet. The timbers used are from six to fourteen feet in length. The amount of rock taken from the mine during the present year is 18,000 tons. Rock on surface at present is 1,000 tons; below, mined out, and ready for hoisting, 2,000 tons. The average monthly expenses of the mine, $18,000. Average number of men employed, 175; cords of wood consumed daily, 8; price of wood per cord $3 50, delivered at the mine. The average yield of the rock per ton from October, 1867, to October, 1868, $32 80. One per cent. of all the rock crushed is saved in sulphurets, and the latter worked by the chlorine process in the company's works at the mine, under charge of Professor Deetkin. The sulphurets for the past year have yielded on an average $200 per ton. They are saved in the Paine and Stevens buddle, which is thought by the Watt Brothers to be the best in use, provided close attention is paid to the working. The dividends from this mine, since it has been thoroughly opened, have never been less than $20,000 per month, and for several months have gone as high as $30,000. Dividends are paid monthly to the stockholders. The last twelve days' run yielded $25,200, outside of the battery and sulphurets."....The Idaho mine, now known to be the S. E. extension of the Eureka, is being vigorously and judiciously worked. According to the *Gazette*:—"The new 15-stamp mill is constantly employed on rock taken from the mine, and is crushing on an average 150 tons per week. They have a surplus of 700 tons of rock on the surface, and employ 70 men in the mine. The Idaho is now being worked at a perpendicular depth of 420 feet. The ledge at this point is from four to four and a half feet wide. The cost of the mill, independent of the hoisting works, is $15,000. Gold is saved from the blankets, the pulp ground in the amalgamating pans, and the sulphurets saved by the Paine and Stevens' buddle. One per cent. of all the rock crushed is saved in sulphurets, they being worked by the chlorine process, and have paid thus far, over and above the expense of working the same, from $250 to $300 per ton."....The Buckeye Gravel Company, on Rock Creek, have struck very rich gravel in their claims on the extension of the old Nebraska lead. The owners are B. F. Stokes, J. W. Watt, I. T. McGowan, Mackie and others. There has been a large amount of litigation concerning the title of this mine, which has prevented its value from being generally known. The legal ownership has now been fully established by our courts, and the claims are being successfully developed. The Kansas Mining Company, one half mile below the Buckeye Company, are vigorously at work on their gravel claims, sinking a double incline shaft."....The *Gazette*, reviewing the mining situation, remarks:—"From present appearances, hydraulic mining will be carried on as generally and successfully throughout the country this season as last season."

Los Angeles County.—The reports from the Soledad district continue to be cheering. Messrs. Polk & Kabler are working their five-stamp mill on ore from the Saratoga lode, and expect to have five more stamps working within thirty days. Messrs. Clark and Gleason have started a large working shaft 8 by 4 in the clear, and intend erecting a ten-stamp mill if the lead looks favorable at one hundred feet deep. A number of new ledges located, though not prospecting rich, yet warrant work, and parties prospecting them find the quality of ore improving. Some Mexicans have found a fine lead of galena of liberal dimensions, about twenty miles from the goid mine. It has a large percentage of silver, and is attracting the attention of men posted in silver mines. Reports on the survey of a road which shall make the distance from Los Angeles twenty-five or thirty miles, instead of sixty or seventy, have been laid before the authorities.

Alpine County.—The Companies in the vicinity of Monitor, viz:—The Morning Star, Monitor Consolidated Co., Imperial, Mt. Bullion, Globe, and Michigan,—are each working five men, and all purpose to continue full gangs through the winter..... The Tarshish Co. have at last succeeded in raising $75,000 working capital.....A 14-inch strata of very rich quartz has been cut in the Gould & Curry tunnel, on Wiseman's claim..... The prospects of soon striking the Pennsylvania Ledge, and that it will be a rich one, are so good, a large number of claims have lately been taken up on it for a distance of ten miles, it being plainly traceable the entire distance, with the exception of about 200 feet.....The Markleeville correspondent writes that the Pioneer quartz mill has shut down to make some improvements.

Inyo County.—The arrival of Mr. Westerville, with two wagon loads of silver and lead bars, weighing 5,000 pounds, from the Owen's River silver mines is mentioned in the Los Angeles papers. He reports the furnaces in active operation day and night, turning out large quantities of bars daily. They have discovered a fine quality of fire-clay in the vicinity, and the difficulty heretofore experienced of making the furnaces stand the heat, has been obviated. Mr. Westerville says that there will be 35,000 pounds of bars shipped to Los Angeles in a few days.

Amador County.—We learn that a rich lead has been discovered, and is now being opened, near Sutter Creek, by a couple of Austrians. Although the lead, so far as it has been developed, is but a few inches in thickness, the rock prospects sufficiently rich to insure a handsome return for working it—$300 having been taken from 15 pounds of the quartz by means of a hand mortar.

Colorado.

The returns of the amount of bullion produced by the several reduction works in and around Georgetown for 1868, show a large increase over the products of 1867, and are therefore very encouraging. The local paper, the *Miner*, hopefully predicts that "with sufficient works to reduce the ore mined during the coming year, the product will be more than trebled." The following is the *Miner's* account of the year's operations:—"Huepeden, Wolters & Co. have taken out, since the works passed into their hands, May 21, 1868, 38046.28 ounces, coin value, $30,101 15. When we consider the capacity of the works, which were only three and a half tons per day, the innumerable drawbacks they have had in the frequent breakage of worn out and worthless machinery, and the many obstacles they have been forced to overcome, we can only say that they have done remarkably well, exhibiting a spirit of energy and perseverance, which had they not possessed, would have enabled their many difficulties to have overcome them. With the new year they start in with their capacity doubled, and steam power in place of water. The stamps will soon be taken out, and a rock breaker and ball pulverizer used in their place. To the present, as well as the previous managers of these works, much credit is due for demonstrating the fact that we have large quantities of ores that can be worked to a profit. The Georgetown Smelting works, under Mr. Herrick's administration, produced 19,800 ounces of silver bullion, coin value $26,730. Schirmer and Bruckner, at the same works, with their Kustel furnace, have produced 8312 ounces, coin value $11,214 20, in five week's working. They have been laboring under many disadvantages, from frequent breakages of machinery and the expense of putting in steam power. They have, however, successfully demonstrated the fact that our rich ores can be treated by smelting, and as high percentage saved as at any works in the world. As high as 96 1-2 per cent. of the fire assay has been saved. We hope to see these works enlarged soon to a capacity to meet the demand, well knowing that they will prove successful. Stewart's smelting and amalgamating works have produced, up to January 1st, 5218.50 ounces of silver bullion, coin value, $5,939. These works have produced this amount in 50 working days, and when we consider their capacity, have done nobly. The work has been principally testing small lots, from one ton to five, from 27 different lodes, the most of it low grade ore, and of course would prove more satisfactory if from one or two of our principal rich veins. To Professor Stewart praise is due for his noble efforts to give us increased reduction capacity, at a lower rate. He has striven with the limited means at his command, to aid in the work of developing our immense resources, and has been successful. With the increased capacity of his works, and the addition of Blatchley pans for raw amalgamation, he will be enabled to largely increase the silver production, as well as to successfully demonstrate the fact that we have large quantities of ores that can be treated with profit, by that process. We earnestly hope he will attain that success for which he has so faithfully worked. There has been produced by the Brown Company, at their own works, and at the Georgetown Smelting works, by Mr. Herrick, 6480 ounces of silver bullion, coin value, $8,748. We have been unable to obtain the amount produced by Garrott, Martine & Co., from January 1st to May 21, 1868. The total for which we have actual figures, is $91,829 35, and we are satisfied that the figures we have not obtained would bring the product up to $100,000 for 1868, against $18,000 for 1867. We have done well, considering the capacity of our works, and the many difficulties under which we have been laboring. This total result does not include the ore that has been shipped east for reduction, which would probably amount to $30,000 more."....We learn from the same paper, January 21, that the Baker Mine, which seemed a few months since to be rapidly sinking into oblivion, is gradually assuming its place among the paying mines of the country. W. H. Crawford, Superintendent of the company, says that the mine is yielding, at present, over a ton of first class ore per day, the average assay of which is $740. This ore is being taken out with but one drill at work, and the total expenses of the company are not more than $170 per week. We also learn that the Grass Valley Gold Mining Company, of Colorado, have completed arrangements for the erection of reduction works of the Grass Valley Bar and propose to purchase ores from any that have them for sale. It is said that the company propose to extend their works as rapidly as business requires, until the capacity of their extensive water power is exhausted."..... The Central City *Herald*, January 12, has a few notes on mining in Nevada. It says:—"Sparks & Bristol have erected a whim over their mine and started up yesterday. Wheeler & Vanderen will put up a whim over their mine on the Forks in a day or so. They have a 14 inch vein of galena in the bottom of their mine, and are selling the ore to Jo. Watson, of Georgetown. Besides this, the mine is yielding a large quantity of ore suitable for a stamp-mill, which is being crushed at the new Beverly & Koonce Mill. It pays very well. The galena is about as pure as any we ever saw. Specimens will yield as high as 75 per cent., and an average of the galena vein will go as high as 60 per cent. We saw some remarkable cubes of lead this morning, which surpass anything of the kind we have ever seen, for size and singularity of shape. A. M. Jones has got through the cap on the Hidden Treasure, which is situated near the Forks. He has struck a large body of very rich ore. It is thought to be the same as the California Lode. James McCorge is going to start upon the Cooper Lode, near the Flack, in a day or so. B. C. Waterman sold his last lot of first class ore to Professor Hill for $172 per ton. He is building a new mill in Eureka, near Col. Lewis' ranch, which will be ready to start up next week. It will have 15 stamps. A consolidation has been effected recently, of the Ophir, Gilpin and First National property, on the Burroughs' Lode, making 962 feet. The capital stock is $1,000,000, with a working capital of $100,000. Geo. Randolph, superintendent. The intention is to go to work at once."....The *Chieftain* is informed that Maxwell's quartz mill, on Ute Creek, cleaned up, from one week's run, on the 7th, $5,000 in gold. It is believed that hereafter the average product will be not less than $1,000 per day." The *Register*, speaking of bar mining about Idaho, says it is rather dull at present, owing to the cold weather, "yet a few parties keep 'pegging away,' and we understand are generally making good wages. Maj. Cannon & Bro. are working the old Spanish claim on Spanish Bar, with good results. Schwartz and Mixer are doing a good business on Illinois Bar. Reeder & Co. are still working on Bull Bar, which is paying very well. Wright, Clenfield & Co.'s claim is being worked by parties whose names we did not learn, but we understand that it is paying well. John M. Dumont has got work started on both the Garden City and Alden Tunnels, in the former of which he has some fine looking ore."... The same paper has a lengthy but interesting account of the North Star mine and works (of which Mr. GEO. R. MITCHELL is superintendent), from which we take the following extract:—"Three substantial buildings have been erected, joined one to another, and forming three sides of a square, and admirably arranged for convenient and economical working. The west wing, which is 25×95 feet, covers a 20-stamp mill, the engine and boiler, and wood-house, and west shaft. The boiler is 54 inches in diameter, and fourteen feet long, splendidly set up, on a solid foundation of masonry. The engine is a fine 85 horse-power machine, permanently set up, and works like a clock. Between the boiler and the shaft are the massive friction-spool hoisting works, which, like the engine and boiler, are set up on pillar blocks of solid masonry, built up from the bed-rock, along side of which is a foundation of the same character for a mine pump, when it shall be needed. The engine, boiler and hoisting works are so arranged that one man attends to the whole, acting as engineer, fireman, and brakesman for the hoisting apparatus, work which, at mines, requires two men. In the main building, which is 26×86, are the blacksmith shop, coal room, ore room, office and store room. In the east wing is the east shaft, and hoisting works similar to those in the west wing, with the exception that while in the west shaft they use an ordinary bucket to hoist in, in this shaft they have an automatic skip, which, as it comes up out of the shaft, dumps its load into a shute, and rights itself for another trip to the lower regions. It works with the most perfect regularity and safety, requiring but two men to run it—a brakesman on the surface and a man to fill it below. It brings up 20 cubic feet of ore at a load, and works very rapidly. The hoisting works in this building derive their motive power from the engine in the west wing through a three inch shaft, which extends from one to the other. This shaft will also drive the stamps in the new mill which it is in contemplation to build between the east and west wings, and which will connect the two on the south, forming a square block of buildings with a court enclosed. In the basement of the west wing a plain, but very comfortable room has been fitted up for the special use and convenience of the miners. It is furnished with a large stove, washing conveniences, seats, etc., and when the men come out of the mine, wet and muddy, instead of having to go to their cabins half a mine distant, their wet clothes freezing on the way in winter, or weighing them down with their weight of water and mud in summer, they can repair to this room, which is always kept warm, there changing their wet and muddy clothes for those that are clean and dry hanging the wet ones to dry on hooks arranged around the room for that purpose, and when they next want them they find them dry and warm, instead of wet and frozen. This is a great convenience, and a matter of much importance to all miners who value health and comfort, and one which they will duly appreciate. We hope to see such conveniences more generally provided by our mining employers. Mr. Mitchell is, we believe, the first and only mining agent in this vicinity who has provided such conveniences, and it will be sure to pay him. After looking over the surface improvements, we were provided with a suit of mining clothes, candle, &c, and in company with Mr. McCarg, the efficient mining captain, we decended the main shaft, to the first level, 160 feet below the surface. In this level, which is of convenient width and hight for the transportation of ore, is an iron track laid its entire length, on which an iron ore car runs to convey the ore to the shafts. "Mills" arranged along the level at intervals of 24 feet, which connect with the stopes above, and the ore is thrown into them by the miners, and from them it is dumped into the car when wanted, by simply raising a trap in the side of the level, above the car. A very large amount of ore has been taken out of the mine, and there is still a very large body of three to five ounce ore in sight above this level. We went through all the stopes, and examined the ore veins at all points. The vein of mill ore was from six inches to two feet in thickness at different points, and will average twelve to fifteen inches. Probably an average of three inches of this amount is smelting ore, which, at the bottom, Mr. Mitchell informs us, yields about four ounces per ton. The balance of the crevice is run under stamps, and yields, in the lower stopes, ten ounces per cord, while that nearer the surface yields but five to six. All the underground work is done by contract, and at favorable rates. The business is all superintended by the mining captain, who sees that the work is properly done, and that the worked out ground is left in a safe condition so as not to endanger the permanent working of the mine at a greater depth. Both the working shafts are well timbered—are of convenient size for bucket, pump and ladder ways, and are provided with good, strong ladders, with platforms at convenient intervals. The west shaft is 230 feet deep, and levels have been started both ways from the bottom. In the east level there is a fine vein of rich looking ore. In the west level it does not look quite as well. In the main shaft, a good vein of fine ore shows all the way from the first down to the second level, with the exception of one place, where it is pinched up for a few feet. Altogether the mine presents a very encouraging and promising aspect. The work both above and below ground is being thoroughly and economically done. No expense is incurred for show,—everything seems to be on a substantial, permanent business basis. All the improvements are of a thorough, *permanent* character, and reflect much credit on the ability and good judgment of Mr. Mitchell, the agent of the company. He has had many difficulties to contend with, and necessary and expensive improvements to make in the way of enlarging and securing old shafts, erecting necessary buildings and machinery, all of which has been done thus far, in a very thorough manner, and so far as we could, see, very economically. He is now raising eleven to thirteen tons of ore per day, which amount can easily be doubled in a very short time, as soon as some necessary improvements now in process, can be completed. The ore that they are raising comes from the upper stopes, and very near the surface. About three tons of this amount of ore is selected and sold to the smelters. The balance is run under stamps, and yields five ounces per cord. The ore from the lower stopes will yield nearly twice that amount. The second level, which has already been started, will open up a large body of this character of ore, when the yield of the mine must necessarily be nearly or quite doubled."

Arizona.

The last mail from Prescott brings favorable reports of progress in mining. The Chase tunnel is in 215 feet, and sulphurets rich and plenty are coming out. Water also is plenty and causes a great deal of trouble.... Mr. Chas. Berger, of the Sterling Mine, has a mill and furnace running. The last run is said to

have paid well. Some beautiful gold bars, worth about $500, are exhibited. . . . The Platanca mine, adjoining the Sterling, is yielding rich specimens. . . . Graves & Co., and French & Curtis are working away at the head of Lynx Creek, in the Walker Quartz Mining District. Mr. Griffin has just completed a furnace for Fleury, Graves & Co., and milling and desulphurizing will soon commence. . . . The Vulture and Smith & Wickenburg mills, at Wickenburg, are grinding away night and day, and there is not an idle man in town. . . . Jackson Brothers, with Mr. Moses Lovejoy, an old and experienced California miner, Capt. Shoupe and others are preparing to work their hydraulic claims on Lower Lynx Creek, eight miles east of Prescott. Mr. Z. Jackson, Mr. Lovejoy, and some eight or ten others, arrived recently from California, with some four or five wagons, drawn by splendid mule and horse teams. They brought a year's supply of provisions, clothing, tools and two sets of hydraulic apparatus. Ever since their arrival, they have been busily at work hauling lumber to the claim, strengthening flumes, etc., and are now nearly ready to pipe. Their diggings are very rich, and extensive enough to give employment to a thousand men. . . . About thirty single men and one family have arrived from the east, and most of the men are preparing to go to Black Canyon Diggings, Bradshaw District, where, in less than two months, there will be over a hundred miners. . . . The various companies that own claims in Big Bug are preparing to work them, and a week hence some fifteen men will be at work in the District. . . . In Mohave and Yuma counties, quartz and placer mining is being followed with great success. Near Hardyville, Mohave county, some Mexicans have struck surface diggings that pay well.

Oregon.

A writer in the *Mountaineer* reports that "several new claims have lately been opened on Pine Creek, near Canyon City, which promise from the prospects to pay well. The quartz mill of Williams & Co. has arrived, and will soon be set up and in motion. The location is about three miles east of the town, near the Prairie Diggings. The removal of troops from Camp Logan has caused some excitement, and a number of petitions have been put in circulation and forwarded to headquarters, asking that the post shall not be abandoned. The greater part of the Camp Harney grain contract was filled by the Grand Ronde Valley farmers. This leaves a large surplus of grain remaining in the valley. The farmers of John Day Valley, it is hoped, will hereafter look to their own interests, and not be controlled by speculators. The Indians at Camp Harney are quiet, and appear to be well satisfied with their treatment."

Idaho.

The Rising Star Mill, in Flint District, is completed, and parties recently from there say it is turning out bullion at the rate of between two and three thousand dollars per day. The *Avalanche* says of it: "The mill, in every department, is a complete success, and reflects great credit upon its projector, James G. Fair, Esq. We congratulate the stockholders in the Rising Star S. M. Co. on their good fortune and the success of their enterprise." . . . There was over $120,000 (currency) worth of bullion assayed in Owyhee County during the month of December, 1868.

Montana.

The quartz lodes in the vicinity of Diamond City are opening splendidly. Mr. D. W. Corbin, the owner of the Durant lode, will have a mill in full operation by the 1st of July next on his lode. Dr. Bradbury has also purchased a mill, and is about to have it erected at the end of a tunnel which intersects the Western Star and Black Warrior lodes. . . . The miners' strike in the Unionville Mines, for $60 per month, has subsided, the miners resuming work at the old price of $50 per month.

COPPER.

Michigan.

ONTONAGON DISTRICT PRODUCTS IN 1868.

We glean from the Lake Superior *Miner* the following additional annual statements of the amount of copper produced and shipped by companies operating in Ontonagon District:

	Tons.	Lbs.
National Mine—Masses	200	783
Barrel work	37	507
Stamp work	81	258
Total	318	1548
Evergreen Bluff Mine—Masses	53	1142
Barrel work	104	101
Stamp work	69	816
Total	227	59
Knowlton Mine.—Masses	11	393
Barrel work	30	182
Stamp work	91	34
Total	132	609

RECAPITULATION.

National	318	1548
Evergreen Bluff	227	59
Knowlton	132	609

No returns have been received from the Minnesota, Superior, Rockland, Ogima and Aztec mines.

COPPER SHIPPED.

Ridge	110 tons	524 pounds.
Evergreen Bluff	230 tons	1013 pounds.
Knowlton	131 tons	98 pounds.

The question of dividing the State of Michigan and making a Territory out of the upper part of the peninsula is being agitated by the Michigan press. The mining journals of the upper peninsula warmly commend and urge the project, and the inhabitants seem to be equally fervent in its behalf. The plan certainly affords many arguments in its favor. The geography of the country and the dissimilarity of the interests of the two sections are the main reasons urged in its behalf. Whether the necessity for separate governments is sufficiently strong *now* to demand the immediate consummation of the plan, is the question that the legislative authorities will soon be called upon to decide. The Portage Lake *Gazette* has the subjoined additional products for December:

Hancock Mine—Barrel	1 ton,	1,190 lbs.
Stamps	16 "	454 "
Total	18 "	1,644 "
Quincy Mine—Stamp	96 "	1,540 "
Franklin Mine—Mass, Barrel and Stamp	80 "	587 "

Mining news is very scarce. The Aztec mine in Ontonagon District continues to show splendidly. The mass of copper has been stripped for fifteen or twenty feet in length, and is yet going in strong. No particular change at the other mines in this district.

Arizona.

The Prescott *Miner* understands that work upon the William's Fork copper mines will soon be resumed.

LEAD.

Missouri.

Messrs. FERD. F. ROZIER & Co., of St. Louis, furnishes us with a statement, which we print below, of the product of the past year of the lead mines, for which they are agents. We cannot forbear saying, in this connection, that if others interested in the mines of this thriving state, and, in fact, in every mining state and territory in the Union, would send to the JOURNAL OF MINING for publication similar statements, we would not long be without statistics and an accurate record of our progress in the production of the useful minerals and metals. Will our readers make a note of this? Messrs. ROZIER's statement is as follows:

John Bess & Co., furnace, Mine a la Motte	26,619 pigs,	or	1,916,568 lbs
Weber, Valle Betten & Co., furnace do	12,142 "	"	873,432 lbs
Valle Mines	8,019 "	"	673,596 lbs
F. K. Boyd, (to Dec. 1st)	1,093 "	"	80,882 lbs
Merrimac Silver Lead Company, (to July 1st)	861 "	"	63,714 lbs
F. A. Evans, *one smelt*	30 "	"	1,402 lbs
Cole County	392 "	"	27,792 lbs
Franklin County	1,535 "	"	88,984 lbs
Hesselmeyer Zinc Works	1,291 slabs,	"	42,603 lbs
St. Genevieve White Lead	6,813 barrels,	"	1,700 t's

We have a cabinet of the different ores of the State, consisting of lead, copper, cobalt and nickel, earth cobalt, zinc, carbonate of zinc, tin, antimony, cinnabar, gold and silver quartz, asbestos, barytes, carb barytes, magnetic and iron; also, the Cape La Croix natural paints, China and other clays, representing the following mines:

Mine a la Motte, Madison County.
Valle Mines, Jefferson County.
Bisch Mines, Jefferson County.
Plattin Lead Company, Jefferson County.
F. R. Boyd, Washington County.
L. W. Harris, Washington County.
Hesselmeyer Zinc Works, Washington County.
Merimac Silver Lead Company, Franklin County.
F. A. Evans, Franklin County.
Mt. Hope & Cove, Franklin County.
Maupin & Sheppard, Franklin County.
Missouri Smelting and Mineral Land Co., Franklin County.
Clark & Eaton, Cole County.
Minerva Mining Company, Christian County.
Merrimac Iron Works, Phelps County.
American Iron Mountain, St. Francis County.
Pilot Knob, Iron County.
Moselle Iron Works, Franklin County.
Cape La Croix Paint Works, Cape Girardeau County.
China Clay, Cape Girardeau County.

COAL AND IRON.

[FROM AN OCCASIONAL CORRESPONDENT.]

North Carolina.

A GLANCE AT THE MINERAL RESOURCES OF NORTH CAROLINA—IRON, COAL AND RAILROADS.

RANDOLPH Co., N.C. Jan. 25th 1869.

EDITOR AMERICAN JOURNAL OF MINING:

SIR: The wide plateau of country lying within the borders of the counties of Randolph, Guilford, Davidson and Mecklenburg, and between Shepherd and Caraway Mountains on the south, and the Alleghany range on the north, has yielded millions of dollars worth of the precious metals within the last forty years. Copper, lead, zinc and iron also abound, and I am assured by Capt. GEO. P. OATES, an experienced miner of high character, of Jamestown, N. C., that nickel exists there, and he thinks, also, platina. As to iron, there is no end to it—deposits of the richest ores abound almost everywhere. One mine, especially, about 28 miles south of High Point, on the N. C. Railroad (Central) and near Franklinsville, in the County of Randolph, yields the finest iron experienced founders and others in this country have ever seen. Yesterday I talked with a founder, who has worked iron from the mine, and he pronounced it superior to the Norway and Swedish irons, combining in itself the softness and malleability of the one and the fineness and durability of the other. LOUIS LEACH, Esq., of Trinity College, N. C., informed me that during the late war bars produced from the ore of this mine were wrought into gun-barrels by no other process than simply boring out the centre and grinding off the edges of the bars to the proper shape for the gun This testimony is true, and I ask every reader of the JOURNAL OF MINING if any such iron as this has been found elsewhere in America. The Adirondack Mountains seem to yield a similar iron, but I doubt if any iron in the world is equal to this. Moreover, as the Chatham coal fields lie a few miles below this mine, we have the wherewith here to manufacture steel equal to any in the world. But while this mine was wrought during the war, and a mill and forge stand there ready for use, nobody goes forward now to use them. Southern men have always been famous for essaying individual and independent effort in business, and not for forming wise combinations that, by united strength, they might remove great difficulties.

I write this article especially for the eyes of enterprising men, hoping that some of them may be induced to prospect this region in the iron interest. The gold already commands its full share of attention. Thousands of fortunes lie scattered over these hills, and buried beneath them, in the rich, ferruginous deposits that ages have gathered here. I write — but I have not a particle of personal interest in a foot of land here, as I am a citizen of Georgia.

One more point and I'll stop, albeit I could fill several numbers of the JOURNAL OF MINING with items the world should know. A railroad is in active and earnest contemplation, from Egypt, via the N. C. Coal Fields, to High Point. This road will assist greatly towards developing what I believe to be the finest mineral region of the South, if not of America—a region unsurpassed for salubrity of climate and admirably adapted for farming operations.

WM. HAUSER, M. D.

Nevada.

The Nevada papers are discussing the probable value of the coal deposits recently discovered in the neighborhood of Argenta. They all agree that if the coal found there is as good as reported, or better than that found in other localities in Nevada, that the State has a valuable adjunct to its future prosperity. The Reese River *Reveille*, in reviewing the developments that have been made thus far in coal mining in Nevada, discourses as follows:—"If the reported discovery of veins or deposits of coal of good quality, in the neighborhood of Argenta, should prove to be well founded, it will prove of more benefit to the State than the discovery of a dozen deposits of silver ore like the Eberhardt. No samples of the Argenta coal have yet been brought into Austin, and we have not learned whether that article of lignite contains the same percentage of non-combustible matter that marked the deposits thus far discovered in the State. Deposits of coal of greater or less extent have been found in different parts of the State within the past seven or eight years, the principal of which are specified in the 'Mineral Resources of the Pacific States and Territories.' The first discovery of coal was made by Whitman in 1861, at a point near Dayton, in Lyon County, but after expending some $10,000 in sinking shafts and running tunnels and constructing roads, the work proved a total loss. Less than 100 tons of coal was disposed of, which was about the amount raised from the mines. It was tried for generating steam, but failed. Shortly after the location of the Whitman mines a much heavier deposit of lignite was found twelve miles further south in El Dorado canyon, and in a similar geological formation. The coal from this deposit proved serviceable for domestic fuel but was unfit for furnace or forge purposes. The principal claim in El Dorado canyon was that of the Newcastle Company, the coal obtained from which resembled the brown coal of Germany. An analysis of the coal from the vein of the Newcastle Company shows it to contain—moisture 19.65, hydro carbonaceous matter, 40.59, fixed carbon, 28.31, and ash 11 parts, with traces of sulphur and iron. The coal discovered in this State contains very little sulphur, but it is yet valueless for the uses of the forge and iron works, on account of the large percentage of volatile matter it carries, which detracts from its merits as a fuel. Following the above discoveries thin seams of lignite coal were observed in the vicinity of Fort Churchill, but they have not been shown to possess any value. In 1864 coal was supposed to exist in the neighborhood of New Pass station, and the circumstance was one of the 'big things' in Austin in those days; but the coal proved to be a kind of obsidian or volcanic glass. Shortly after this two veins of coal, one 12 inches and the other 30 inches thick, were discovered in Volcano district, in Esmeralda County. Those veins were easily traced for several rods by the bituminous debris on the surface, and are apparently of an earlier period than the lignite found in other parts of the State. The impurities in this coal amount to about 40 per cent., yet it gives a strong heat, and burns almost entirely to a white ash. It has been used successfully as a substitute for charcoal by assayers and blacksmiths in this city, and the article tested was taken from the depth of a few feet below the surface. An article of soft coal outcrops for several miles along the foot hills of the Wassack Mountains, about twenty-five miles north of Aurora and near the east fork of Walker River. The seam ranges from a mere thread or shale to six feet in thickness, and the coal burns readily. A lot taken from a shaft 30 feet deep underwent perfect combustion on being ignited while lying in a heap on the ground. A vein of anthracite coal is reported to occur in the district of Paharangat, a short distance from Hiko. The vein is reported to be 15 inches thick, and the coal to burn rapidly. The 'coal signs' at Crystal Peak are pronounced to be similar to those in El Dorado canyon. The latest report of the discovery of coal is that of Argenta, but whether that article will prove to be of better quality than the previous discoveries in various parts of the State is doubtful. 'Learned blacksmiths' pronounce it equal to the best English coal; but sensible men will keep cool until they have learned the 'testimony of the rocks.'"

SLATE.

Pennsylvania.

ANNUAL REVIEW OF THE SLATE TRADE OF SLATINGTON.

Subjoined we present an accurate statement of the Slatington slate product during the year just closed. As the first result of our efforts in this direction in behalf of the slate trade, it is particularly valuable. An example is now set for the miners and manufacturers of other districts to follow. Will they do so? Or will they continue to foster an exclusive and apathetic spirit? We hope soon to hear from other districts in Pennsylvania and Vermont.

MINING AND MANUFACTURING SLATE ON THE LEHIGH RIVER, AT SLATINGTON AND VICINITY, FROM JAN. 1, 1868, TO JAN. 1, 1869.

The product of Jones & Williams (Franklin Quarry), was 7,422 squares, 34 feet, roofing slate; 15,000 square feet flagging.

Henry Williams (Blue Mountain Slate Works), 6,569 squares, 41 feet, roofing slate.

Lehigh Slate Company, 5,567 squares, 11 feet, roofing slate; 328,903 rough school slate, average size 7 by 11; 210,840 manufactured school slate, or 1,757 cases; 3,500 square feet flagging; 32,011 square feet mantles and black boards.

Keystone Slate Company, 1,616 squares roofing slate.

Trout Creek Slate Company, 1,902 squares roofing slate.

David Williams Slate Works, 1,150 squares roofing slate; 1,100,000 rough school slates, average size 7 by 11; 420,000 manufactured school slate, or 3,500 cases.

Blue Vein Slate Company, 1,750 squares roofing slate.

American Slate Company, 1,842 squares, 92 feet, roofing slate.

Kuntz & Woodring (Eagle Quarry), 935 squares roofing slate.

Star Slate Company, 1,985 squares roofing slate.

Brooklyn Slate Company, 640 squares roofing slate.

Locke Slate Company, 10,345 squares, 12 feet, roofing slate; 259,141 rough school slates; 168,886 manufactured school slates, or 1,477 cases.

McDowell Slate Company, 2,963 squares, 42 feet, roofing slate; 40,713 rough school slate, average size 7 by 11.

Jones & Town (Penllyn Quarry), 2,390 squares, 49 feet, roofing slate; 22,100 rough school slate, average size 7 by 11.

Morgan Jones Slate Works, 230,000 manufactured school slate, or 1,200 cases.

Welchtown Slate Company, 650 squares roofing slate.

Diamond Slate Company, 1,100 squares roofing slate.

Hope Slate Company, 950 squares roofing slate.

Monitor Slate Company, 600 squares roofing slate.

Thos. W. Parry (Peach Hill Slate Works), 4,120 squares roofing slate.

Twin City Slate Company, 2,100 squares, roofing slate.

Heimbach Slate and Mining Company, 3,415 squares, 37 feet, roofing slate; 300,000 rough school slate, average size 7 by 11.

Mauch Chunk Slate Company, 2,975 squares roofing slate; 20,000 rough school slate.

Frank Howers (Eagle Slate Works), 1,650 squares roofing slate: 1,200 rough school slate.

National Slate Company, 800 squares roofing slates; 40,000 rough school slate, average size 7 by 11.

Continental Slate Company, 1,240 squares roofing slate.

Penrrhynn Slate Company, 1,200 squares roofing slate.

Bethlehem Union Slate Company, 1,000 squares roofing slate.

Lehigh River Slate Company, 3,500 squares roofing slate.

H. W. Harper's Slate Works, 2,760 squares roofing slate; 348,000 manufactured school slates, or 2,900 cases.

A. W. Lerch's Slate Works, 360,000 manufactured school slate, or 3,000 cases.

Harper, Roberts & Co., 585 squares roofing slate; 152,000 rough school slate, average size 7 by 11.

Cast Steel Rails—The Bessemer-Heaton Controversy.

From the *Railway News*, an able and authoritative British publication, we take the following review of the relative merits of the Bessemer and Heaton processes for the production of cast steel. Says the editor:

"We have watched with considerable interest a controversy which has been going on for some time past in the *Times* on the relative values of the processes for the production of cast steel suitable for railways. Experience has shown the value of the rails made from Bessemer steel, and the advantages which would result to railways generally from their adoption. The London and North-Western have established very extensive works at Crewe, where steel on the Bessemer process is manufactured, and we believe that every railway in the United Kingdom, as well as many in the colonies, are now using steel rails made on this process. More than 100,000 tons of these steel rails are used by English and colonial railways annually. Every company using this description of rail is, therefore, interested in any process by which a saving may be effected in their manufacture. We read with considerable satisfaction the announcement in the *Times* that by a process patented by Mr. Heaton, of the Langley Works, Erewash Valley, iron of an inferior character to that used in the Bessemer process could be made into first-class steel; that the Cleveland and Nottinghamshire pig iron could, in fact, be converted into cast steel. This feat accomplished, there would at once be a saving of many thousands to railway companies, and a proportionate addition to already-depreciated dividends. Like the early promise of so many great inventions, this of the Heaton process has, however, been cruelly nipped in the bud by the stern logic of facts and figures:—theories perfectly correct, and on the surface unimpeachable, have broken down before the tests of practical experience. The correspondence which has been published has fairly raised the important issue, Can steel be produced of as good a quality from inferior iron and at less cost than that of the Bessemer process? The question raised refers to two distinct conditions—quality and cost. The two elements of the inquiry hinge upon and are inseparable from each other. If the steel produced by Heaton is inferior to that of Bessemer, the question of cost need not be discussed, for a bad material would be dear at any price. If, on the other hand, the cost of conversion is greater, the new process offers no advantage over the existing process of Mr. Bessemer. At the starting point we have the admitted fact, that the Bessemer rails have been fully and thoroughly tested in this country and other parts of the world, and, thus far, Mr. Bessemer has a standpoint, from which he cannot be removed until his rival can show equally satisfactory results. We have, then, only opinion and theory to guide us at present on the point, that impure iron will make as good steel as metal of better quality. Mr. Bessemer says that under the Heaton process "the metal solidifies while in a state of mechanical admixture with the sand and soda; thus, instead of obtaining cast steel by his process, Mr. Heaton obtains only a lump of spongy porous metal intermixed throughout with slag and scoria," he defines the cast steel made by his own process as "steel made into a perfectly homogeneous mass while in a fluid state;" and he contends that it is to this circumstance alone that the steel owes its great value for the purpose of rails. We have looked in vain through Mr. Heaton's letter from any satisfactory reply to this fatal objection to his process. He states that the cooling effected in the new process is not so great as that caused by the forcing of cold air by Bessemer through the molten fluid. So far as we are able to comprehend the question, there is no cooling whatever by the use of atmospheric air, for, as any tyro in chemistry knows, the oxygen, uniting with the large amount of carbon contained in the pig iron, must raise, rather than depress the temperature to an enormous extent. And so it actually is in the case of this Bessemer process, which we remember to have seen some years since, when the process was exhibited. The metal acquires a temperature so much above the temperature of molten steel, that a mass of half a ton weight of steel put into it will be melted by this superabundant heat, and the whole still retain a liquidity like water, and a snowy dazzling whiteness which no unaccustomed eye can bear for a minute to rest upon. On the other hand, the immense volume of heat absorbed in first liquifying the 270 lbs. or 224 lb. of nitrate required by the Heaton process, and then converting it into vapor, robs the cast iron of a very large portion of heat. Then, again, the cast iron perforated plate covering the nitrate has also to be melted in the process; and this, too robs the metal of still more heat. Then, too, the metal which replaces the nitrate has to occupy the cold chamber in which the nitrate, mixed with sand and lime was packed. This completes the cooling operation, and a solidified porous lump results. The letter of Mr. Heaton does, in fact, confirm the view taken by Mr. Bessemer, for in one part he speaks of the "steel from his converters passing at once into his patent reverberatory furnace," kept there in a molten state, and then run into ingots; and it is then, he contends, as good as Bessemer steel. So far as we understand it, then, this furnace is necessary before the crude Heaton steel can be made equal to that produced by the old process.' The use of the reverberatory furnace is thus necessary to convert the crude Heaton steel into a material equal to the Bessemer. But the Bessemer steel is complete before this stage of the reverberatory furnace is reached, and the comparison can only be made under equal conditions on each side.

"On the question of quality of the steel, no improvement in the Bessemer can, so far as we can ascertain, be effected by passing it through the reverberatory furnace; on the contrary, the molten sheet would almost certainly absorb an additional amount of sulphur in the process, and this would be a disadvantage rather than a benefit. The cost of this re-melting is, however, the great obstacle in the way; it cannot be effected at a cost less than 30s. to 40s. per ton, and this is sufficient to neutralize all the gain that may be effected by the treatment, in the first instance, of cheaper qualities of iron.

"With respect to the employment of the reverberatory furnace for remelting cast steel, numerous attemps have been made to accomplish this object. The nearest approach to success has been obtained by the beautiful and truly philosophical apparatus of Mr. Siemens; but we are not aware that his system has yet been brought into actual practice. What is the nature of Mr. Heaton's furnace is not stated, and unless it can accomplish even greater results, and certainly at very much less cost than those obtained by Mr. Siemens, his only resort will be to the crucible method of re-melting, and this will put him out of court altogether. But the Bessemer steel is complete before the stage of the reverberatory furnace is reached in the Heaton process, and any economy that may be effected in previous stages would be more than counterbalanced by the cost of this latter process.

"On this view of the case, and on a summing up of the arguments on both sides, it would appear on Mr. Heaton's own showing that he cannot produce steel of an equal quality to that of Bessemer, except under conditions which unfavorably influence the question of cost of manufacture. Upon this question of comparative cheapness, Mr. Bessemer gives in our opinion a very complete answer. Mr. Heaton says he can make "good steel and iron as cheap and cheaper from the commonest pig as Bessemer can from the most expensive brands." Assuming that the qualities of the steel are identical, the difficulty with which we are met at the outset in the discussion of this proposition is the very practical one—that as the first cost of the commonest pig, and the nitrate required for the treatment of a ton weight, cost together more than equal weight of the pure iron used in the Bessemer process, it would appear that in this matter of cost the new cannot compete with the present process. If the manufacturer has a given weight of pure metal, which costs say £5 to operate upon, it is difficult to understand how an equal weight of the inferior metal, costing say, £4, which requires to be purified with ingredients costing £2, making the total cost £6, can be worked more economically than the pure metal, costing the lower price. If in the Heaton process the manufacturer starts with a cheap pig-iron, giving him an advantage of 20s. to 30s. per ton over the cost of the Bessemer raw material, he will be required to destroy 270 lbs of nitrate of soda, which at the market price of 15s. per cwt., is equal to 36s. on the ton of crude iron; so that what he gains by the employment of the impure iron will be lost by the cost of the materials employed in getting rid of the impurities.

It would certainly be a novelty in the industrial or metallurgical arts if the qualities of a manufacture could be identical when in the one case the highest quality of a raw material was employed, and in the other only the worst description. It was the announcement of the possibility of accomplishing the result that has given so much of interest to the discussion to which we have referred. On referring to Dr. Miller's report, we are struck by the fact that the impure crude iron as purchased for the Heaton process contained 2.950 of phosphorus, and that the steel as turned out from this material contained 0.266 of highly deleterious substances. The raw pig iron used by the Bessemer steel makers is usually guaranteed by the makers not to contain more than 0.075 of phosphorus, making a very important difference in favor of the Bessemer over the Heaton process. The possibility, therefore, of producing good steel out of inferior iron thus again resolves into the commercial question of what it will cost, and on this point the superiority at present rests with Bessemer.

"The root of the whole question between the two inventors lies in the important matter of the reverberatory furnace necessary for transforming the metal solidified in the Heaton process into the condition which will place it in comparison with the Bessemer steel. Of course any attempt to heat the metal by the old crucible process would be out of the question for railway purposes, and we have no facts whatever bearing on the suitability of Mr. Heaton's patent reverberatory process for melting crude steel. Until we have some facts bearing upon this important part of the process, it would be premature to express any definite opinion, and we wait with considerable interest further communications on the subject."

Improved Method of Working Roasted Gold and Silver Ores in Pans and Barrels by Amalgamation.

The leaching process, for which a patent has been issued to G. Kustel, is applicable to ores from which only a low grade amalgam can be obtained, in consequence of the presence of the base metals—iron, copper, lead, antimony and arsenic. Simple as this process is, it elevates pan and barrel amalgamation to a higher degree of importance. Millmen are aware of the fact, that a certain class of ores, and principally tailings, when amalgamated in pans after roasting, furnish a metal which cannot be melted in a crucible. It consists of metallic iron containing silver, partly alloyed, and partly separated in buttons. Instances of this kind have occurred in the Illinois mill (Nev.) where the proprietors some years ago brought up refractory but rich silver ores, to be worked in pans after roasting. The resulting iron amalgam ruined the purchasers. The old Sutro mill got out hundreds of pounds of iron amalgam from roasted tailings, which, after retorting, had to be dissolved in sulphuric acid, in order to obtain the silver. The same kind of amalgam was also obtained in the Dayton mills, at Dall's mill, etc. On the other hand there are a great many mills turning out bullion of from .500 to .700 fineness. The base metals, entering the amalgam, do not only put down the fineness of the bullion, but they actually prevent, to some extent, the complete amalgamation of the silver. These base metals, after roasting, being chlorides, must ordinarily be decomposed before amalgamation, at the expense of quicksilver and of the pan. There are instances where from ten to twelve pounds of mercury was lost to every ton of ore, and where the pans were destroyed in less than a year. The main object of the present process is to remove the base metal chlorides before the ore is subjected to amalgamation. For this purpose Mr. Kustel applies a very simple, old process—that of leaching. Most of the chlorides are soluble in hot water, and can be easily removed by lixiviation. An addition of some sulphuric acid is in many instances very useful, but cannot be administered if some lead should be present in the ore, in which case muriatic acid should be employed; generally, hot water is sufficient. The leaching is carried on as long as a reaction of dissolved metal is perceived in the leach. The ore so treated is then ready for amalgamation. To illustrate the effect of leaching, it may be stated that a charge of 300 pounds of refractory ore from Idaho was equally divided after roasting, one of which was directly amalgamated, the other after leaching. The former amalgamation gave a retorted metal which melted into an untractable lump of iron, while the lixiviated portion yielded a silver bar .897 fine. In both cases the amalgamation was done in the usual manner, under application of heat. The advantage of leaching the roasted ore before amalgamation, consists 1st. In obtaining a higher percentage of silver. 2d. In saving from 50 to over 100 per cent. of quicksilver. 3d. In making the pan last several years longer. 4th. In saving the greater part of the copper; and 5th. In a shorter roasting, as there is no necessity of decomposing the chlorides before amalgamation by an increased heat. The expense, compared with the advantages, is a mere trifle,—the heating of water for leaching. Even cold water will answer although with a little less effect. Some ores, however, require to be treated first with cold water. It must be mentioned, that although the chloride of silvor is not, like the base metal chlorides, soluble in water, some of it will nevertheless be carried out; but this occurs only at the first attack of the water, when the solution of the undecomposed salt and of the chlorides becomes so concentrated that a little silver chloride is dissolved on the Augustin principle. There is no difficulty practically, however, in preventing the escape of dissolved silver,

Not all the copper contained in the ore is converted by the roasting into chloride of copper, there being also formed a subchloride which is not soluble in water; but this is easily decomposed in the pans, so that in this case a considerable amount of copper would be found in this amalgam. There are several ways of reducing the subchloride of copper, to a greater or less extent, according to circumstances.

It may be mentioned here, that a patent has been granted to Mr. Thomas Rowan, of Glasgow, for a similar application of leaching, which has for its purpose the removing of phosphorus from iron ores before smelting. The ore is subjected to a chioridizing roasting, whereby chloride of phosphorus is formed, which is extracted by lixiviation.—*San Francisco Mining Press.*

Deadly Effect of Indian Arrows.

Much has been said of the bad policy of the Government in issuing firearms to the Indians, but Gen. Sanborn, in his recent lecture, expressed the opinion that the most deadly weapon which the Indian can use in his mode of warfare is the bow and arrow and the spear. The effective distance to which an arrow can be thrown is about eighty yards, and the speaker said that an expert warrior drawing these flint-headed shafts from his quiver, three at a time, can discharge them so rapidly that he will have the third arrow in the air before the first has reached its destination. At the Phil. Kearney massacre, eighty-two men and officers were killed in less than one hour, and only two of them were killed by bullets. From the traces of burnt powder about the wounds of these two, it was conjectured that after being disabled by arrows, they had shot themselves with their revolvers, to avoid falling alive into the hands of their cruel foes.

SYCEE SILVER.—Readers of Asiatic news are frequently puzzled by the occurrence of the term sycee silver, when Chinese matters are alluded to. The term is simply "shoe silver" when translated into English. The Chinese do not coin silver as we do—or at least have not been accustomed to do so—but use the Mexican dollars as a medium of exchange, or sycee silver: that is pure silver run into little oblong cakes, somewhat in the shape of a Chinese shoe, but more in form of an ordinary japanned or laquered bread-tray, one piece fitting into another, so that they may be put up in long rolls or sticks and readily fastened together. This silver does not pass for a fixed value, so much a piece like our money, but by weight, and merchants in the course of large transactions pay out or take in tons of it at a time. A small gold coin issued by the Chinese Government has recently made its appearance, and a copper coin worth one-thousandth of a dollar. Cash has been abandoned in the Empire for a thousand years at least.—*San Francisco Alta California.*

A ghastly scientific diccovery is reported from Turin, where Professor Gasturani, the celebrated oculist, has found a way of killing animals by forcing air into their eyes a few seconds, and almost without causing them pain. Experiments were recently made at the Royal Veterinary School, and it is said that they have fully proved the truth of the professor's invention. Within the space of a few minutes four rabbits, three dogs and a goat were killed in this manner. The most remarkable fact is that the operation leaves absolutely no outward trace.

A Parisian has invented an electric cane, which is intended as a defence against highwaymen and burglars. It consists of a *horn* inserted in the end of a cane, which horn contains an electric battery and a *lamp* with two powerful reflectors. The intensity of this light temporarily *blinds* any person at whom it is pointed. The lamp is kindled at will by pressing a small knob at the other end of the cane, which knob communicates with an electric wire.

FILIAL PIETY.—The following conversation, which, had it come to his knowledge, the late Mr. Leech would have used as an illustration of "Life in the Mining Districts," has just been repeated to us: First Collier—there's been a foire (explosion) at Jackson's pits. Second Collier—My feyther worked there. First Collier—Yes, and he's blowed all to pieces. Second Collier—By gum; he's got my knoife!—*Stoffordshire Advertiser.*

—Mr. Du Chaillu lectured Thursday evening before the American Geographical and Statistical Society upon Equatorial Africa. His remarks were mainly confined to an account of the race of pigmies and cannibals found on the west coast of Africa, about a degree and a half from the equator. The former of these are called Obougos, are about 4 feet high and covered with hair. The latter are known as the Fans, are large, stalwart and fierce.

MARKET REVIEW.

FRIDAY EVENING, Feb. 5, 1869.

Gold and Silver Stocks.—Smith & Parmelee has recovered from the recent decline, and sales are now reported as high as $2 40. Consolidated Gregory now stands at $2 75@2 85. Grass Valley has advanced to 46. In other stocks no marked change is noticeable since our last report:

	Bid.	Asked.
Alameda Silver	..	
American Flag	.. ..	25
Bates & Baxter Gold	.. ..	
Benton Gold	15	25
Bobtail Gold	.. ..	
Black Hawk Gold	..	
Consolidated Gregory	2 75	2 85
Edgehill Mining	2 50	
Gold Hill	..	
Gunnell Gold	.. ..	50
Grass Valley	46	70
Hamilton G. & S. B.	.. ..	85
Holman	..	5
Hope Gold	..	
Twin River Silver	..	
Gunnell Union	.. ..	
Combination Silver	..	2 50
Semsenderfer	..	....
Quicksilver	22½	25
Atlantic and Pacific	....	
Kipp & Buell Gold	..	5
La Crosse Gold	15	20
Liberty Gold	.. ..	
Manhattan Silver	75 00	120 00
Midas Silver	..	
Montana Gold	50	55
New York	..	1 00
Nye Gold	..	
Owyhee Mining	..	22 00
People's G. & S. of Cal	..	
Quartz Hill	70	75
Rocky Mountain Gold	8	..
Smith & Parmlee Gold	2 35	2 50
Texas Gold	.. 3	
Corydon	..	
Symonds Fork Gold	20	
N. Y. & Eldorado	..	40
Mariposa	8	10
Mariposa preferred	26½	26½
Eagle Gold	5	12

Copper Stocks.—Davidson has declined to 30 cents. Central is quoted at the same figure. At Boston, to-day, prices have ruled as follows, for Copper Stocks.

Copper Falls	15½	Quincy	25
Franklin	15½	Cary Improvement	8
Hancock	3	Hecla	70
Minnesota	2	Bos. Hart. & Erie R. R.	27½
Calumet	50	Isle Royal	..
Water Power	15½		

Petroleum Stocks.—The market is a shade less firm, with the following prices:

	Bid.	Asked.		Bid.	Asked.
Bennehoff Run	.. 25	45	Rynd Farm		
Brevoort			United Pet. Farms	.. 15	..
Buchanan Farm	60	65	Union		
Central	85	90	United States	1 40	1 75
Clinton Oil	....	....	Sherman & Barnsdale	..	..
National	3 75	4 00	Second National	.. ..	.. ..
N. Y. and Alleghany	.. 50	1 00	Bliven	.. ..	.. ..
Pithole Creek	1 00	1 20	Rathbone	..	.. ..
Home Petroleum	3 00	....	Northern Light	.. 30	50
Pacific Oil	..	....	Bergen Coal and Oil	..	..

Miscellaneous Stocks.—Wallkill Lead is quoted at 32@33; Rutland Marble, 16 00@16 00; Brunswick City Land, 9 50@10 00; Cumberland, 36½; Lehigh and Susq. Coal, 90@100; W. U. Telegraph, 37½; Quicksilver Mining Co., 23½; Mariposa R. Pf., 25; Manhattan Gas, 250; Pacific M., 115@116½; Bcuns. C. L., 10; Merch. U. Ex., 49½; N. Y. Centra., 161@161½; Hudson, 135@135½; Reading, 94½; Norwich & Wor. R. R., 98; Boston W., 15½; Mich. S. N. I. R, 92½; Ill. Cent. R., 138½@139; Chicago & Northwestern, 83½; Cleveland, Columbus Cin. and Ind., 74; Chicago & N. W. Pf., 82½; M. & St. P., 64½; do., Pref., 78@79½; N. J. Central R., 113½; Morris & Essex, 87; Clev., Col. & In. C., 52; P. Ft. W., Chicago & Rock Island, 117½@117½; Alton & Ter. H., 40; Ohio & M. R., 36; do., Pref., 76½; H. & St. Jos. R., 110½; T. W. & West, bet. call, 63½.

State, R. R. and other Bonds.—Tenn St 6's, new, 67½; Tenn. St. 6's, ex cpn., 68½; Va. State 6s, ex coup., 57; Conn. 6s, 100; Georgia 7s, 92; N. Carolina St. 6's, new, 61½; Ala. State 8s, 92½; N. Y. Cent. 6s, '83, 91½; Erie 2d, 92; Chi. & N. W., con. conv'e, 94½; Tol. & W. 1st m., ext'd, 91½; do., 2d m., 84; G. W. 2d, 78½; C. & R. I. and P. R. R. 7s, 94; Morris & Essex 2d, 90; Cleve. & Pits., 4th, 75; M. & E. 1st, 97½. Mil. & St. P. 2d M., 84; Col. C. & Ind. Cent. 1st, 85½@86; St. Louis & I Mt. R. R., 1st m., 84; Mil. & St. P. 8s, 1st m., 103; Mil. & St. P., 1st m., 92; Metropolitan Bank, 140; Fourth National Bank, 103½;

Government Bonds.—Governments are strong, in sympathy with the rise of 5-20s in London. Prices are as follows:

U. S. 6s, 1881, coupon	112½@112½	U S 5-20s, '65, new coup.	108½ 108½
U. S. 5-20s, 1862, coupon	113½ 113½	U. S. 5-20s, 1867, coupon	109 109½
U. S. 5-20s, 1864, coupon	109½ 109½	U. S. 5-20s, 1868, coupon	109½ 109½
U. S. 5-20s, 1865, coupon	111 111½	U. S. 10-40s, ex. coupon	108½ 108½
6 Per Cent. Bonds, P. R. R.	101½ 101½		

Foreign Exchange.—The market is dull and weak. We quote:

Lon. (pr. bks), 60 dys	109½@ 109½	Swiss	5.17½ 5.16¼
Lon. (pr. bks), sight	110 110½	Hamburg	36½ 36½
London, prime com	....	Amsterdam (bankers')	41 41½
Paris (bankers'), long	5.15½ 5.15	Frankfort (bankers')	41½ 41½
Paris (bankers'), short	5.13½ 5.12½	Bremen (bankers')	79 79½
Antwerp	5.17½ 5.16½	Berlin (bankers')	71½ 72

Gold—Gold is heavy and weak; the price, after opening at 135¼, declined to 135. The weakness of exchange has encouraged the "bear" feeling. Loans are made at 5@6 per cent. "for carrying." The demand for temporary loans of currency on stock collaterals is active, at 7 per cent, and there is no difficulty in obtaining the required accommodations at this rate; upon Government securities, in exceptional cases, large transactions are made at six per cent. The Stock market was moderately active, with a fair share of business in various stocks.

The following are the quotations for other coin:

American silver	95½@ 96½
Mexican dollars	103½@104
English silver	480 @485
Five francs	95½@ 96½
English sovereigns	487 @489
Twenty francs	385 @387
Thalers	70½@ 71

The following will show the Exports of Specie from the port of New York for the week ending January 30, 1869:

Total for the week	$962,907
Previously reported	2,251,742
Previously reported since January 1, 1869	$3,214,379
Same time 1868	$7,149,331
Same time 1867	8,190,309
Same time 1866	2,287,894
Same time 1865	$3,253,070
Same time 1864	6,121,695
Same time 1863	4,624,574

Statement of business at the United States Assay Office at New York, for the month ending January 30, 1869:

Deposits of Gold—	
Foreign coins	$12,000 00
Foreign bullion	3,000 00
United States bullion	447,000 00
Total	$462,000 00
Deposits of Silver, including purchases—	
Foreign coins	$12,000 00
Foreign bullion	18,000 00
United States bullion (contained in gold)	6,000 00
Montana	4,000 00
Colorado	10,000 90
Lake Superior	500 00
Nevada	7,500 00
Total	$58,000 00
Totul deposits, payable in bars	400,000 00
Total deposits, payable in coins	120,000 00
Total	$520,000 00
Gold Bars stamped	100,269 62
Transmitted to U. S. Mint, Philadelphia, for coinage	8,481 59

Petroleum—Business small, but firm prices are steadily demanded; 250 bbls. Crude in bulk, were sold at 21½c.; refined standard white is held for 37 cents. For Philadelphia delivery, there is a slow inquiry. Standard white is held at 36½ to 37c. We note sales of 500 bbls for first half February, at 36½c.: a line reported from April to June, at 37c.

Receipts for the week ending Feb. 2	pkgs.	1,447,761
Exports for the week ending Feb. 2	galls.	3,673,440
Exports from Jan. 1	galls.	
Exports same time last year	galls.	3,699,382

The following is the quantity exported from other ports, Jan. 1 to Jan. 30:

	1869.	1968.
From Boston, galls.	217.595	158,556
Philadelphia	1,556,758	1,856,231
Baltimore	8,500	82,250
Portland	....	6,800
Cleveland	....	....
Total	1.792,847	2,103,837
Total exports from the United States	5,416,116	5,770,507
Same time in 1867		3,580,760
Same time in 1866		6,621,763

Stock in yard Feb. 1.	1869	1868
Crude, bbls.	13,800	5,176
Refined	*32,092	33,170
Naptha	none.	5,272
Residuum	200	208
Total, bbls.	47,092	44,896
Stock January 1	59,200	40,503

* Including 5,000 bbls. Refined on shipboard.

Copper has been quiet but steady at 26@26¼ for Baltimore, and 26¼ for Detroit and Lake Superior. Sales of the week foot up 1,250,000 pounds, part March delivery at 27, and April at 27½.

The London market is steady at £74 for Chili.

Tin.—The market is rising, with sales of 1,800 slabs. Straits is from 31@31¼c., gold. The quotation of to-day is nominally 32c., gold. Banca--100 slabs fetched 32c., gold English, 100 tons were sold at 30c.

The London market is 114 for Straits.

Spelter—150 tons were sold at 6½, for Silesian.

Lead is steady, with an average business for consumption at $6 25@$6 30.

Zinc—We quote American Dry at 7½@8c.; Foreign, 12½@13c.; French, 11½@12c.

Lime—Rockland is in fair demand, at $1 60 for Common and $2 for Lump.

Regulus Antimony—We note sales of 5 casks at 13c., gold.

THE IRON TRADE.

NEW YORK, February 5, 1869.

Trade is very quiet, and our remarks of last week may be applied to its condition this week, with equal accuracy. There is little or no Scotch Pig in first hands, and only about 1,000 tons remaining in dealers' hands. We quote, as before, $40@$42 for fair to best brands. American remains at a stand still. The leading companies still refuse to name a price below $40 for No. 1, and have declined offers of $38 for some considerable parcels. The only sales we notice are 100 tons No. 1, supposed Allentown, at $40, and 550 do. Gray Forge, $34@$35. We notice besides, 2000 tons old T Rails at $16 50 for Western delivery. From store, Bar is irregular and nominal, the tendency being in favor of the buyer. A lot of 100 tons Trenton Wire Rods, made from Boiler Scrap, sold at $115—Refined Charcoal bring $135, cash.

BOSTON, January 30, 1869.

The market for Pig Iron, says the *Commercial Bulletin*, is steady and a shade firmer, though the demand is very moderate. There is less pressure to sell on the part of New York importers, who have reduced their stocks. The cheap lots of domestic lately offering have also been cleared off the market, and holders of the better grades are very firm. Notwithstanding the large current production, Pennsylvania makers are not disposed to reduce their rates, but are holding above the views of buyers. There is considerable diversity of opinion as to the probable relations of supply and demand for the next year. Manufacturers think that, with many railroad enterprises nearly completed, the consumption of iron is likely to fall off, and that prices must come down to a materially lower range. But ironmasters, looking to the efforts being made for a higher tariff, are not ready to take orders at prices which dealers are willing to pay Manufactured iron, of some descriptions, is in better demand; but prices are without material change. There is a fair movement in hardware and castings adapted to the Southern and Western markets. Railroad iron continues in good request. Bar and sheet are also selling more freely at the reduced rates. Scotch Pig is steady, with small sales of Gartsherrie and other brands No. 1, in lots for consumption, at $42@$44 50 ℔ ton for the various brands. American is quiet and unchanged, with sales of retail lots at $40@$45 ℔ ton, for the different numbers. Charcoal Pig is selling at $50@$60 ℔ ton, as to brand. Bar Iron is in better demand, with further sales of English and American, from store, at $87@90 ℔ ton for common, and $93@$95 for refined. Rails are firm and in steady demand, with sales at $54@$55 ℔ ton, gold, for English, and $81@$82 ℔ ton, currency, for American. Cast Steel is selling at 18@23c. ℔ ℔ for English, and 21@23c. for American. Anchors are selling at 8@8½c. ℔ ℔, Chain Cables, (¼@2 inches thick, 8@7½c. ℔ ℔; Coil Chains, ¼@1¼ inches thick) 11½@8c. ℔ ℔. Boiler Plates are selling at 7½c. for flanges, 5½c. for C No. 1, and 5½c. ℔ ℔ for common and tank. Russia Sheet is more active, with large sales at 19½@13½c., gold, as to the number. English and American do. is dull and selling at 5½@9c ℔ ℔. Nails are quiet and steady, with sales at 5c. ℔ ℔ for assorted sizes. Old Iron is in steady demand at $1 30@$1 60 ℔ 100 lbs. for Cast, and $1 90@$2 for Wrought Scrap.

PHILADELPHIA, February 3, 1869.

The supply of Pig Metal is light, and it is held with considerable firmness. Sales of No. 1 Anthracite at $39@$40, and No. 2 at $38. Scotch Pig and Blooms are nominal. Manufactured Iron may be quoted at $82 50@87 50 ℔ ton for Bar.

Lehigh Valley Iron Trade.

Pig Iron transported by the Lehigh Valley Railroad Co. for the week ending Jan. 30, 1869:

From	Tons.	Total.
Carbon Iron do	200	8,880
Lehigh Valley Iron Co.	280	10,640
Thomas Iron do	580	36,390
Lehigh Crane Iron do	50	32,485
Allentown Iron do	235	35,230
Robert Iron do	120	10,485
Glendon Iron do	500	24,174
Other Shippers	450	20,065
Total	2,415	178,349

Imports of Foreign Iron and Steel at New York.

For the week ending Jan. 29.

	Quantity.	Value.
Railroad Iron, bars	7,916	$53,521
Hoop, tons	80	3,192
Sheet, tons	20	1,239
Pig, tons	1,249	18,130
Other Iron, tons	1,676	41,571
Chains and Anchors, packages	130	6,895
Tubes, packages	1,319	5,962
Nails, packages		
Steel, packages	2,063	34,917
Machinery	44	5,452
Pipes	....	1,526
Anvils	13	1,378
Wire	548	6,677
Total value		$180,460

Market Prices.

NEW YORK, Feb. 5, 1869.

DUTY.—Bars, 1 to 1¼c. per lb.; railroad, 60c. per 100 lbs.; boiler and plate: 1¼c. per lb.; sheet, band, hoop and scroll, 1½ to 1¾c. per lb.; pig, $9 per ton, polished sheet, 3c. per lb. Payable in gold.

			STORE PRICES.		
Am. pig, fy. No 1, best,	$39 00@40 00		Bar, Swedes, ord'y sizes	— —	145 00
" " 2x frdy,	36 00	38 50	Bar, Eng. and Am., rf'd.	90 00	95 00
" Grey Forge	35 00	36 00	Bar, Eng. & Am., com.	87 50	90 00
White and Mottled	32 00	35 00	Scroll	125 00	160 00
Pure white for Cal. mar.	32 50	— —	Ovals and half round	122 50	150 00
Scotch Pig, No. 1, best bd	41 00	42 00	Band	125 00	— —
" " " outside,	40 00	— —	Horse Shoe	125 00	— —
Wt. No. 1 Scrap f'm yd.	....	45 00	Rods, ¼@3-16 inch	100 00	160 00
Ex ship	43 00	....	Hoop	135 00	185 00
Bar, Ref., En. & Am.	90 00	92 50	Nail Rod, per lb	8½	10
Bar, Sw's, as. sizes, gold	87 50	80 00	Sheet, Rus. as'd. Nos. (gold)	10	11½
Old Rails	47 00	....	Sheet, s'gle. D & T. com	5½	7
R. R. Iron, For., fm Stock gold	54 50	55 50	Rails, Eng., gold, ton.	54 00	55 00
R. R. Iron For., to imp.	55 50	60 00	Rails, American	75 00	77 00
" " Amer. at wks. currency	76 50	— —	STEEL.		
R. R. Iron, Am., deliv'd	80 00	81 00	English, cast 2d & 1st qual.	18	@23
Stl rails of any pattern at works, currency			Eng. Spring 2d & 1st qual	10	12½
Solid Steel rls. For., gd.	95 —	— —	Eng. Blister 2d & 1st qual.	11½	20
Street Rails at works	85 00	— —	English Machinery	13½	16
Light rls. for mines &c. at works	$85 00@	— —	Eng German 2d & 3d qual.	14	16
Do. delivered here	....	— —	Am. Blister, "Black Diam'd,"	10½	16
			American, Cast, Tool "	19	—
			American, Spring "	10	13
			American Machinery "	—	13
			American German "	10	13

IRONTON, OHIO, January 28, 1869.

The Ironton *Register* says:—Firmness and low stocks characterize the metal market. For some time yet holders of metal anticipate sufficient business at quoted rates, and consequently evince no disposition to meet any kind of proposition at lower figures. Some brands of foundry are offered at $40 cash, but $41 may be considered the ruling rate, while $42 on reasonable time is offered by holders. We quote:

Mill	$36 00@$38 00
Foundry, Hot Blast	40 00 42 00
Cold Blast	55 00 60 00

The furnacemen are active in their preparations for the next blast. Stock is being accumulated on similar contracts to those given a year ago. Very little, if any, difference exists in this respect. This infers a belief on the part of metal men that their productions will command a price little different from ruling rates, at least, no less. For the margin, which has been running through the last year's business, has not been the cause of any supreme felicitation among the furnacemen, as their income returns this spring will show. Whether or not their anticipations will be realized, and the present rates sustained throughout the year, is a vital question, and one which, we think, admits of serious doubt. Hopes fastened on tariff improvements, we consider idle and vain. The Western market for metal is slowly being appropriated by Western producers. Still, there may be an increased demand arising in the disposition of consumers, especially of railroad iron, to use a better article than English manufacturers are compelled to throw upon our market to make a profit against the tariff duties.

PITTSBURGH, January 30, 1869.

We have to report, says the *Commercial*, an active market for raw iron. In our last review of the market, we referred to the fact that negotiations were then pending for heavy lots of forge pig.

We are now enabled to report sales during the week aggregating between 25,000 and 30,000 tons, principally of standard grades of forge descriptions.

As most of the irons were sold to arrive, and have yet to be made, the entire product of most of the furnaces of the Mahoning and Shenango Valley will be required for the next two months to fill the sales. The sales for the past two weeks were:

	Last Week.	This Week.
Bituminous	4,250 tons.	26,500 tons.
Anthracite	1,170 tons.	1,220 tons.
Charcoal R. H.	845 tons.	.... tons.
Alleghany Coke	335 tons.	1,400 tons.
Total	6.700 tons.	29,120 tons.
Blooms	280	170

Without particularizing all the sales, we report aggregate:

BITUMINOUS COAL SMELTED IRON LAKE SUPERIOR ORES.

23,300 tons Medium to Open Gray Forge, $38@$39—4 mos. from delivery.
700 tons favorite brand, to arrive, $38—cash March 1.
2,500 tons deliverable at furnaces, $36 50@$37 00—4 months.

ANTHRACITE.

400 tons favorite brand of Neutral Forge	$42 00—4 mos
600 tons common brand of Neutral Forge	37 00—cash
70 tons Mottled Red Short	37 50—3 mos
150 tons Mottled Red Short	37 00—cash

ALLEGHENY COKE.

300 tons Gray Forge	38 00—6 mos
1000 tons Gray Forge, to arrive	36 00—6 mos
100 tons Red Bank low grade	38 00—6 mos

BLOOMS.

150 tons Charcoal	95 00—4 mos
20 tons Juniata	95 00—6 mos

MILWAUKEE, Wis., January 29, 1869

PIG IRON.

Prices this week are quoted—

Buffalo Union, A 1	$49 00	Lake Superior No 3 (charcoal)	46 00
Buffalo Union, B 1	46 00	Iron Ridge, No 1 (Sweed's)	40 00
Lake Superior No 1 (charcoal)	47 00	Scotch	50 00@53 00
Lake Superior No 2 (charcoal)	46 00		

MANUFACTURED IRON.

Flat Bar	$0 3½@0 4½	Round and Square	3½ 7½
Horse Shoe	5 5½	Oval	4½ 5
Heavy Band	4½ 5½	American Spring Steel	11½ 13½
Hoop and Light Band	5 10	Plough Steel	11½ 13½
Eagle Sheet Iron	6½ 9½	Am. Tool Steel (best)	.. 17½
Boiler Sheet Iron	5½ 6½	Nails, $5.	

CINCINNATI, February 1, 1869.

PIG.—Demand moderate, but with very light receipts. Prices are buoyant, with a further advance.

	Per ton. Days		Per ton. Days
Hanging Rock H. B. Mill.	$41 42—90	Tennessee Cold Blast	45 47—90
Hanging Rock H.B. F'dry.	44 45—90	Missouri	50—90
Hanging Rock Cold Blast	53 —90	Blooms	100 105—90
Hanging Rock Car Wheel	55 60—90		

Iron.	Per ton.	Iron.	Per ton.
Bars, Welsh, in L'n	£6 10 0 £6 15 0	Pig, No 1, in Clyde	2 14 0 2 19 0
Bars, W., to arrive	6 10 0 6 12 7	Pig, f o b in Tyne or Tees	2 9 6 . . .
Nail Rods	7 0 0 7 2 6	Pig, Nos 3, 4, f o b in Tyne or Tees	2 6 6 2 7 0
Do., Staff's'e, in L'n	7 12 0 8 10 0	Railway Chairs	5 10 0 5 15 0
Bars, in London	7 10 0 9 10 0	Railway Spikes	11 0 0 12 0 0
Hoops, in London	8 2 6 9 15 0	Indian Charcoal Pigs, in London	7 0 0 7 10 0
Sheets, single	9 0 0 11 0 0	Steel.	
Pig, No 1, in Wales	3 15 0 4 5 0	Swede, in k's (rol'd)	15 10 0
Ref'd metal, in W's	4 0 0 5 0 0	Swede, in k's ham'd	15 0 0 15 10 0
Bars, com'n, in W's	6 0 0. . .	Swede, in fagots	16 0 0 . . 0
Bars, Merchant, Tyne, or Tees	6 10 0 . . .	English spring	17 0 0 23 . 0
Bars, railway, in W's	6 0 0 6 0 0		
Bars, Swede, in L'n	9 17 6 10 5 0		
To arrive	10 0 0 10 5 0		

THE COAL TRADE.

NEW YORK, Feb. 5, 1869.

The market is in a very unsettled condition. Coal is plenty, and buyers are few. The great question at present agitating the trade is—what will be the price of coal at wholesale at the opening of spring? (April 1st). That the prices current now are remunerative all admit, but to reduce them would be fatal to the trade. With the opening of transportation, and a new schedule of tolls, which will, no doubt, be fixed at about the same rates as last season, coal, if it maintains its present figures, will barely pay a profit. What, then, are we to expect? Clearly another general stoppage, a short allowance, and a general advance. As though to insure such a calamity, the Pennsylvania Coal Company issued the following circular to-day, which fell like a bomb-shell in the midst of the camp.

"OFFICE PENNSYLAVANIA COAL COMPANY, NEW YORK, Feb. 5, 1869.

"From present indications it is anticipated that shipments of coal at Newburgh may be resumed on or before the 1st of March next. This company will therefore receive orders for coal to be delivered at Newburgh during the period of one month after opening of the river to that point, at the following prices:

Lump, per ton of 2,240 pounds	$4 50
Steamer, " "	4 50
Grate, " "	4 50
Egg, " "	4 60
Stove, " "	4 90
Chestnut, " "	4 40

"Freight to New York, seventy cents per ton. The above prices are for cash. The right is reserved to advance prices at any time, except upon contracts made prior to such advance. GEO. A. HOYT, Treasurer."

The trade during the past three months has been anything but a paying business to the wholesale dealers, and it was only the prospect of fair prices that kept soul and body together. Now all the bright hopes of dealers are dispelled, and they must, like the "gold gamblers," live on one another. But the question arises—why this promulgation of prices at so early a date? Is it to influence buyers at the coming auction sales, or to force the transportation companies into a low scale of tolls? Some say one, others say both: all, however, agree that it cannot but prove disastrous to the best interests of the trade. There is a "little story" back of the whole transaction, which will by-and-by leak out—*nous verrons*.

The Lehigh Coal and Navigation Company and the Wilkesbarre Coal and Iron Company will remove to their new and elegant offices, No. 80 Broadway, next week.

Messrs. WHITE, FOWLER & SNOW, dealers in all the favorite coals, can be found at 72 Broadway.

Trinity Building is being slowly repaired. Messrs. SAMUEL BONNELL, Jr., and the Honey Brook Coal Co., of which Mr. JAS. H. LYLES is manager, still have their offices there.

Our Prices and Freights have been all carefully corrected this week. Those that are left blank are so because the companies have not yet issued them for this month.

The following will show the exports of coal from the port of New York for the week ending Feb. 2, and for the season to that date, also the amount exported last year for the same period:

Exports for the week	tons	300
Do. from January 1	do	6,985
Do. same time last year	do	4,553

BOSTON, January 30, 1869.

The demand for household purposes, says the *Commercial Bulletin* is very slack, owing to the unseasonably mild weather. For steam, gas and manufacturing descriptions, the market is quiet and unchanged. English Cannel is in small stock, with sales in large and small lots at $19@$21 ℔ ton. Pictou and Sydney are nominal at $8 50@$9 ℔ ton, by the cargo. Anthracite is dull and tending down, with the supply rather in excess of the demand. Cargoes delivered here are nominal at $9@$9 50 ℔ ton. The article is selling by retail at $10@$11 ℔ ton, as to size and quality, but mostly at the inside rate.

PHILADELPHIA, February 3, 1869.

There has been considerable activity in Lump and Chestnut, and prices are well maintained.

The following table exhibits the amount of Coal that was passed over the various routes of transportation from the Pennsylvania Coal districts for the week ending Jan. 30, 1869, and for the season to that date. A comparison is also made with the amount transported the corresponding week in 1868, showing the increase or decrease, as the case may be:

COMPANIES.	1868. WEEK.	1868. TOTAL.	1869. WEEK.	1869. TOTAL.	INC. OR DEC. WEEK.	INC. OR DEC. YEAR.
Phil. & Read. R. R.	35,868	349,996	38,742	324,761	d 2,879	d 25,235
Schuylkill Canal..	....	....	....	....	....	....
Lehigh Valley R. R	30,663	310,291	43,030	333,678	i 12,367	i 23,386
Lehigh & Sus. R. R	....		21,029	57,883	....	. .
Lehigh Canal.....	....	....	....	....	....	....
Scranton North...	9,178	39,814	11,168	39,789	i 1,990	d 025
Scranton South...	21,303	90,581	29,956	118,441	i 8,653	i 28,860
Penn. Coal Co. rail.	11,222	52,306	17,702	68,613	i 6,480	i 16,307
Penn. Coal Co. canal	....	....	....	....	....	
Del. & Hud'n Canal	....	....	....	....	....	
Shamokin	5,810	23,386	9,443	28,612	i 3,633	i 5,226
Trevorton.....	189	623	936	2,157	i 747	i 1,534
Short Mountain...	502	2,799	937	3,306	i 436	i 506
Lykens Valley Co.	1,590	6,836	396	3,156	d 1,193	d 3,679
Hunt'g'n & B'd T'p	2,402	8,894	7,170	24,685	i 4,788	i 15,791
Wyoming South..	....	....	....	....	....	
Wyoming North..	....	....	....	....	....	
Williamstown Col.	....	....	....	....	....	
Total.....	118,722	885,526	118,722	1,005,081		
				885,526		
Increase.....				119,555		

Report of Coal Transported over Lehigh Valley Railroad

For the week ending January 30, 1869, and previously this season, compared with same time last year:

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	PREVIOUSLY Tons. Cwt.	TOTAL. Tons. Cwt.
Total Mahanoy.....	386 17	12,538 11	12,925 08
Total B. Meadow.....	9,057 15	57,104 15	66,162 10
Total U. Lehigh.....	651 15	2,043 10	2,695 05
Total Hazleton.....	20,833 12	146,646 09	167,480 01
Total Wyoming.....	12,022 08	61,195 12	73,218 00
Total M. Chunk.....	33 03		32 03
Total Anthracite.....	42,984 10	279,528 17	322,513 07
Susquehanna region Bit.Coal, F. C'k.		552 03	552 03
To L. & S. R., at Penn Haven for r'l.	45 14	4,122 14	4,168 08
Do. for Canal.....		4,184 06	4,184 06
At Mauch Chunk for canal..		2,259 07	2,259 07
Total by rail and canal	43,030 04	290,647 00	333,677 11
Same time last year.....	30,663 05	279,628 01	310,291 06
Increase.....	12,366 19	11,019 06	23,386 05
Decrease.....			....
Grand total.....	40,431 09	278,106 19	313,538 08
Same time last year.....	30,601 09	275,173 14	305,775 03
Increase.....	9,830 00	....	7,763 05
Decrease.....		2,066 15	....
RECAPITULATION.			
Forwarded east from M. Chunk by r'l	40,286 09	272,453 09	312,739 18
Delivered at Mauch Chunk.....		231 04	231 02
Del. on line of r'd above M. C'k	135 03	2,028 01	2,163 04
Del. ab. M. C. for use of L. V. railr'd.	2,417 18	4,764 17	7,182 15
To L. & S. r'd at Penn Haven for rail	45 14	4,122 14	4,168 08
Do. for shipm't by canal.		4,184 06	4,184 06
At Packerton.....	145 00	603 08	748 08
At M. Chunk for shipment by canal..		2,259 07	2,259 07
Total.....	43,030 04	290,647 07	333,677 11

This report embraces all Coal consigned to L. V. R. R. Co., and individuals at Mauch Chunk and points above that place from December 1st, 1868, to date. The amount so delivered hereafter will be included in the weekly shipments of respective operators.

Schuylkill Coal Trade.

BY RAILROAD AND CANAL, FOR WEEK ENDING, FEB. 4, 1869.

	RAILROAD.	CANAL
St. Clair.....	17,249	....
Port Carbon.....	7,782	....
Pottsville.....	909	—
Schuylkill Haven.....	5,325	....
Auburn.....	656	....
Port Clinton.....	4,334	....
Company's use	2,487	....
Total for week.....	28,742	....
Previously this year.....	286,019	....
Total.....	324,761	
Same time last year.....	349,996	
Decrease.....	25,235	

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

At New York, Feb. 6, 1869.

Schuylkill R. A., choice	$	$....	Schuylkill	Chestnut	$....	....
" Ordinary	....	....	Lehigh	W.A.L'p old Co.	....	....
" W. A. Lump	....	....	"	Broken	....	....
" Steamboat	....	....	"	Egg	....	....
" Broken	....	....	"	Stove	....	....
" Egg	....	....	"	Chestnut	....	....
" Stove	....	....	Shamokin		....	....

SPECIAL COALS.—DEALERS' QUOTATIONS.

Diam'd Vein R.A.,Sch'kill	....	....	Old Co.'s W. A. Lehigh..	6 25	7 50
Locust Dale W. A., "	....	....	Mt. Pleasant.....	6 25	7 50
Honey Brook " Lehigh	6 00	7 25	Buck Mountain.....	6 25	7 50
Harleigh " "	6 00	7 25	Buck Ridge W.A.,Sh'kin.	7 25	....
Spring M'n " "	6 00	7 25	H. Hells, E. F'klin, Lorb.	7 25	....
Sugar Creek " "	6 00	7 25	New England Red Ash..	7 00	....
Sugar Loaf " "	6 00	7 25	Wyoming.....	7 00	....

Dealers in these Coals may be found in our advertising columns.

At Philadelphia, Feb. 6, 1869.

Lehigh L'p and St'mb't..	6 50	6 75	Locust Mount Lump....	..	5 50
" Broken and Egg..	6 75	7 25	" Steamboat.	6 00	6 25
" Stove.....	7 75	8 00	" Broken ...	6 25	6 50
" Chestnut.....	6 00	6 25	" Egg.....	6 25	6 50
Schuylkill R. A.....	6 25	6 50	" Stove	....	7 75
" Chestnut.....	5 00	5 25	Lorberry Coal.....	8 00	8 50
" W. A. Lump ..		5 25	Shamokin.....	6 00	7 00
" Broken	6 00	6 25	Franklin, (Lykens Val.).	8 00	
" Egg and Stove.		6 50	Broad Top	....	5 00
" Chestnut.....	5 25	5 66	Burnside R. A.....	7 00	....
Hill & Harris, Egg & St.		6 75	Powelton Coal Co.....	7 00	
Henry Clay, Egg & St...	6 75	7 00			

Scranton Coal at Elizabethport, Jan. 9, 1869.

(Corrected weekly by D. L. & W. R. R. Co.

Lump.....	5 00	....	Egg.....	5 50	....
Steamer.....	5 25	....	Stove.....	7 50	....
Grate.....	5 00	....	Chestnut.....	5 50	....

Prices for Pittston Coal at Newburgh, Jan. 9, 1869.

(Corrected weekly by Penna. Coal Co.)

Lump, per ton, 2240 lbs..	....	....	Egg " "	....	....
Steamer, " "	....	....	Stove " "	....	....
Grate " "	....	....	Chestnut " "	....	....
Pea " "	....	....			

Lackawanna at Rondout, Jan. 9, 1869.

Lump.....	....	....	Egg.....	....	....
Steamer.....	....	....	Stove.....	....	....
Grate.....	....	....	Chestnut.....	....	....

65 cents additional to New York.

Lehigh Coal at Elizabethport, Jan. 9, 1869.

Lump.....	6 50	....	Stove.....	7 25	....
Steamboat and Broken..	6 00	....	Chestnut.....	6 00	....
Egg.....	6 00	....			

Wilkesbarre Coal at Hoboken, Jan. 9, 1869.

(Corrected by Wilkesbarre Coal & Iron Co.)

Lump.....	6 25	....	Egg.....	6 25	....
Steamer.....	6 25	....	Stove.....	7 50	....
Broken.....	6 25	....	Chestnut.....	6 25	....

At Baltimore, Jan. 9, 1869.

Wholesale prices to trade.			Trevorton R. A.....	$....	....
Wilkesbarre by cargo or car load.....	$8 25	@8 50	By retail, per ton of 2,240 lbs., delivered.....	10 00	10 50
Pittston and Plymouth..	....	8 25	Georges C'k & Cumberland f. o. b. at Locust		
Shamokin R., or W. Ash	....	8 50	Point for shipping.....	....	5 00
Lykens Valley, R. A....	8 50	8 75			

At Havre de Grace, Md.

Cargo prices for shipment *south* of Patapsco River, (drawback allowed of 10 per centum.)			Shamokin R. or W. Ash.	$....	@8 50
			Lykens Valley R. A....	....	8 50
Wilkesbarre and Pittston			Trevorton R. A.....	....	....
W. Ash.....	$....	@8 00			

These prices are nominal, navigation at this point being closed for the season.

At Georgetown, D. C. and Alexandria, Va.

George's Creek and Cumberland f. o. b..... .... @4 75

These are the closing rates. Trade is suspended for the season and will be resumed upon the opening of the C. & O. Canal in March next.

Prices of Gas Coals.

January 9, 1869.

	PROVINCIAL. Duty, $1 25	Coarse. Gold.	Slack. Gold.	AMERICAN.	Coarse. Currency.	Slack. Currency.
Block House.....	$1 75	@$	75	Westmoreland Co ...	$8 50	$8 00
Gowrie.....	1 75		75	Despard Coal Co.....	8 50	8 00
Lingan.....	1 75		75	Penn.....	8 50	8 00
Sydney.....	2 13½		71½	Newburgh Orrel Gas..	8 50	8 00
Pictou.....	2 13½	1	18¾	Delivered in New York.		
Little Glace Bay.....	1 75	1	00	West Fairmont Gas Coal.	7 50	
Caledonia.....	1 60		75	Run of Mine.....	7 00	

Prices of Foreign Coals.

Duty, $1 25 per ton.

Corrected weekly by PARMELEE Bros., 32 Pine Street, N. Y.

Liverpool Gas Caking.....	$ 9 50	Liverpool House Cannel	18 00 @ 19 00
" " Cannel.....	14 00	" " Orrel.	16 00 @ 18 00

Per ton 2240 lbs., Ex. ship.

PRICES FROM YARD.

Liverp'l House Orrel, scr'd..	$20@23	Liverp'l House Can'l,scr'd	$22 00 @ 25 00

Per ton 2000 lb., delivered.

Coal Freights.

(Corrected Weekly).

Freights on Coal Sea-borne from Port Richmond, Philadelphia.

Nov. 21, 1868.—From Philadelphia and Reading R. R. Wharves, Phila., to

Bangor	3 50	New London.....	— — 2 70
Boston.....	— — 3 50	Dover.....	— — 3 55
Providence.....	3 00	Cohasset Narrows.....	— — 3 40
Lynn .....and discharging	3 50	Cambridgeport.....	— — 4 00
Portland.....	3 50	Dorchester.....	— — 3 30
Fall River.....	— — 3 00	Fair Haven.....	— — 2 75
New Bedford.....	3 00	Gloucester.....	3 40 3 50
Salem.....	3 50	Lawrence.....	— — 3 40
Newport.....	— — 3 00	Old Cambridge.....	— — 3 80
East Cambridge.....	— — 3 30	Saco.....	— — 4 10
Newberryport.....	— — 3 75	Roxbury.....	— — 3 55
Portsmouth.....	— — 3 75	Salisbury.....	— — 3 80
Charleston.....	— — 2 00	Greenport.....	— — 2 75
Danversport....and discharging	3 50	Norwich.....	— — 2 75
Amesbury	— — 3 90	Harlem.....	— — 1 45
Beverly.....	3 50	New Rochelle.....	1 30 1 40
Charlestown.....	3 50	Sag Harbor.....	— — 2 75
Hingham.....	3 35 3 40	Spuyten Duyvel.....	— — 1 40
Marblehead	3 60	Williamsburg.....	— — 1 35
Nantucket	— — 3 50	Jersey City.....	— — 1 80
Plymouth.....	— — 3 35	New Brunswick.....	— — 1 20
Provincetown.....	— — 3 50	Alexandria.....	— — 1 40
Washington.....	— — 2 25	Fredericksburg.....	— — 2 20
Calais.....	— — 3 30	Wilmington, Del.....	— — 1 00
Machiasport.....	— — 3 30	Bath	3 70
Hoboken	1 60	East Greenwich.....	3 ..
Hyannis.....	3 50	Providence.....	3 ..
Malden.....	.. 4	Albany.....	1 95
Nahant.....and discharge	3 20	New York.....	1 50@1 60
Weymouth.....and towing	3 50	Troy	1 95

Provincial Freights.

TO NEW YORK.		TO BOSTON.	
Sydney.....	$3 50	Sydney.....	$2 75
Lingan.....	....	Lingan.....	2 25
Cow Bay.....	4 50	Cow Bay.....	....
Port Calidonia.....	4 25	Port Calidonia.....	3 00
Little Glace Bay.....	4 00	Little Glace Bay.....	2 75

From Elizabethport and Port Johnson.

Albany.....	$1 10	@— —	New London	$1 35	— —
Boston.....	2 75	3 00	Newport.....	1 75	— —
Bridgeport.....	1 25	— —	New York.....	50	— —
Fall River.....	1 75	— —	Norwalk.....	1 25	— —
Hartford.....	2 00	— —	Norwich.....	1 50	— —
Hudson.....	1 10	— —	Pawtucket and towing..	1 85	— —
Wareham.....	2 00	— —	Portland.....	2 75	
Middletown.....	1 85	— —	Portsmouth.....	3 00	
New Bedford.....	2 00	— —	Providence.....	1 75	— —
Newburyport.....	3 00	— —	Salem.....	2 00	— —
New Haven.....	1 25	— —	Augusta	3 25	— —

Foreign Freights.

New Castle and Ports on Tyne.....			£13@£15 keel.
Liverpool...			12s. 6d.@15s. ton.
Australian.....	9 50@10 00	Lehigh.....	15 50@16 00
do. Wallsend.....	10 00 10 50	Liverpool.....	13 00 ....
Bellingham Bay.....	11 00 ...	Pittston, ton.....	14 50 15 00
California.....	7 00 9 00	Scranton.....	14 00 15 00
Cumberland cks.....	30 00 32 00	Scotch.....	13 00 ....
do bulk.....	28 00	Vancouver Island.....	12 50 ....
Chili.....	10 00		

Rates of Transportation to Tide Water.

[BY RAILROAD.]

To Port Richmond, Philadelphia.

Philadelphia and Reading Railroad, from Schuylkill Haven..... $2 00

The following are the drawbacks allowed on all coal shipped East of New Brunswick and South of Cape Henry, until further notice.

	Drawback.	Freight.	Nett
Lump.....	35	$2 00	$1 65
Steamboat.....	35	2 00	1 65
Broken.....	..	2 00	2 00
Egg.....	..	2 00	2 0
Stove.....	..	2 25	2 25
Chestnut.....	..	2 10	2 10

From Port Carbon, 8 cents per ton more.

To Elizabethport.

L. V. Railroad from Mauch Chunk to Easton.....	$ 1 04
C. R. R., N. J., Easton to Elizabethport.....	1 55
	2 59
Shipping Expenses at Elizabethport.....	25
Total.....	2 84

To Port Johnson.

L. V. R R.....	$ 1 04
C. R. R. of N. J.....	1 63
Shipping Expenses.....	25
Total.....	2 92

To Hoboken.

L. V. R.R.....	1 04
Morris & Essex R.R.....	1 68
Shipping Expenses.....	25
Total.....	$2 92

SAN FRANCISCO STOCK MARKET.

A telegram from San Francisco, dated Feb. 3, quotes:

STOCKS.	Per Sh.		SHARES.	Per Sh.	
Gould & Curry.....	110@	108	Belcher.....	30	27
Savage.....	72	70	Imperial.....	147	..
Choliar Potosi.....	170	168	Alpha	60	59
Hale & Norcross.....	82	..	Amador	..	..
Crown Point.....	67	66	Kentuck.....	208	207
Yellow Jacket.....	14.97		Ophir.....	39½	39

A Virginia (Nev.) paper says, that all that is required in the lodging house business in White Pine is a lot of stout iron hooks and a few gunny sacks. The hooks are driven into convenient trees and the lodgers hung up in the sacks, after which the landlord has nothing to do till morning but loaf about and keep up fires under such trees as he has located.

The American Institute.

The annual meeting of the American Institute was held last evening, in Room No. 24, Cooper Institute, the President, Horace Greeley, in the chair. Mr. Burd, from a Committee on the admission of members, read a report, from which it appeared that the following candidates had been severally indorsed for membership: Thomas Hamilton, Jr., Wm. J. MacAlpine, Hiram Barnes, Charles Carey, Alfred J. Kelly, Charles H. Hurd, Edgar P. Hill, Cyrus Butler, Henry P. Carlson, and A. Wellington Tyler. A ballot being had, and four-fifths of the members voting in favor, the candidates were elected.

The annual report of the Board of Trustees was read by Mr. Tillman, which mentioned that during the past year the income of the Board had largely exceeded its expenditures, $10,000 of the surplus having been invested in Government bonds. The Secretary read the report of the Finance Committee, for the three months ending Jan. 31, 1869, showing a balance in the Treasury on that day of $5,004 67. The report of the Committee on Agriculture, read by Mr. N. Ely, was very satisfactory, setting forth the beneficial effects resulting from the efforts of the Farmers' Club. Mr. Hibbard, from the Committe on the Library, submitted the annual report, showing that the Library is in good condition, some valuable books having been added during the past year.

They asked an appropriation of $500 to be placed at their disposal. The report was accepted and the appropriation granted. A discussion arose as to what steps should be taken in order to prevent the delays of the State printer in completing the printing of the Society. The subject was referred to the judgment and action of the Trustees.

Bessemer Steel Works at Home and Abroad.

The following list of works where the manufacture of Bessemer steel is carried on, will be of interest as showing the extent to which the Bessemer process has been adopted:

The Bessemer Steel Works, Troy, Y. Y., Messrs. John A Griswold & Co. Co.; Z. S. Durfee, Manager.

The Pennsylvania Steel Works, Harrisburg, Penn., S. M. Felton, President; A. L. Holley, Chief Engineer.

The Freedom Iron and Steel Works, Lewistown, Penn., John A. Wright, President, R. H. Lee, Superintendent.

The Cleveland Rolling Mill Company, Cleveland, Ohio, A. U. Stone, President, John, C. Thompson, Superintendent.

The Wyandotte [Steel Works, Wyandotte, Mich., E. B. Ward, President.

The National Iron Armor Company, Chester, Penn., Wm. B. Reany, President.

The Columbia Iron Works, Johnston, Penn., Charles S. Wood, President, George Fritz, Chief Engineer.

The foreign Bessemer works are as follows:—In Great Britain there are 17 works; in France, 3; In Belgium, 1; in Prussia, 7; in Austria, 10; in Sweden, 12; in Russia, 1; in India, 1. The whole number of converters in use is from 130 to 150, of various sizes, from one ton to ten tons, and the total annual capacity of them all is not less than half a million of tons.

A Novel Method of Catching Mice.

A correspondent of the *Journal of Pharmacy* says:—"Having on several occasions noticed mice in our seed barrels, I bethought me of some method how I might trap the little intruders; they having gained entrance by eating through the chime. To kill them with a stick was impracticable, as the little fellows would invariably escape as soon as the lid was raised to any hight. I then thought of saturating a piece of cotton with chloroform and throwing it in, then closing the lid. On raising it again in a few minutes, I would find that life had almost or quite departed. Having on one occasion left the piece of cotton in the barrel, on again returning, found three mice with their heads in close contact with it, and dead. In the evening I saturated another piece, and placed it in the barrel, and on opening it next morning, to my surprise I found nine dead mice." We recommend our Chicago friends to try chloroform on their rats, and see what effect it will have.

Camptulicon.

This substance is much used in England (but only of late introduced into the United States) as a substitute for carpets or oil cloths, especially in public libraries and churches, as it deadens the sound of footsteps to a remarkable degree. It is made by a combination of powdered cork and the poorer qualities of India rubber, and is painted or ornamented on the surface like oil cloth. It is not suitable for chambers, as being a good conductor of heat, and feeling as cold to the bare feet as wood or oil cloth. A convenient application of this substance is for cleaning knives, and is made by covering a strip of wood with it; then sprinkling the surface with the cleaning powder, and rubbing on the knife. The surface does not wear away, and the result is very satisfactory.

IRON PROPS FOR MINES.—An English patent has been taken out for wrought iron tubes, plugged at their ends with wrought iron, to be used as props in mines instead of the timbers generally employed.

[From the Wooster (Ohio) *Republican*.]

THE MANUFACTURER AND BUILDER.—This practical journal of industrial progress should be in the hands of every manufacturer, builder, mechanic, architect and business man. It is splendidly illustrated with engravings of everything new relative to manufacturing and building, and cannot but furnish a treasure of hints to every practical man. Terms, $1 50 a year; clubs of twenty, $1 each. Address Western & Co., Publishers, 37 Park Row, New York.

[From Heathington's Halifax (N. S.) *Mining Gazette*, Dec. 18, 1868.]

Messrs. WESTERN & Co., the enterprising proprietors of the AMERICAN JOURNAL OF MINING and EL CORREO HISPANO AMERICANO, will issue monthly, beginning with next January, "a practical journal of industrial progress," entitled the MANUFACTURER AND BUILDER. The names of the publishers is sufficient guarantee for the excellence of the undertaking, and we wish the same much success. Subscription only $1 50 per year, Morton & Co. are agents in Halifax.

AMERICAN

Journal of Mining.

WESTERN & COMPANY, Proprietors

ROSSITER W. RAYMOND, EDITOR.

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DESIGNING, LITHOGRAPHING, WOOD ENGRAVING, and JOB PRINTING

Executed in elegant style, on reasonable terms.

W. B. HARRISON is Editor of the Mechanical Department.

NEW AGENCY.—GEO. E. CUMMINGS has been appointed our sole agent in Philadelphia, Pa., for the AMERICAN JOURNAL OF MINING, our new paper, the MANUFACTURER AND BUILDER, and our Spanish paper, EL CORREO HISPANO-AMERICANO. His address is 154 South Fourth street, Philadelphia, Pa., where all information respecting communications, subscriptions and advertisements for these papers will be gladly given to those who may wish to favor us with a call.

In making remittances for subscriptions, always procure a draft on New York, or a *Post Office Money Order*, if possible. Where neither of these can be procured, send the money, *but always in a registered letter*. The registration fee has been reduced to *fifteen cents*, and the present registration system has been found by the postal authorities to be virtually an absolute protection against losses by mail. *All* Postmasters are obliged to register letters whenever requested to do so.

☞ Correspondents, exchanges and others addressing us should be *extremely careful* to write "JOURNAL OF MINING," instead of "MINING JOURNAL," and to give the number of our Box at the Post Office, which is 5969, to ensure safe carriage. Communications intended for publication should be plainly written, and on one side of the paper only.

NEW YORK, SATURDAY, FEBRUARY 6, 1869.

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ORIGINAL PAPERS.—The Chemical Operations, No. IV., by Prof. Hinrichs—Regulations of the Royal Academy of Mining at Berlin, Translated by the Editor.

ILLUSTRATIONS.—Frier's Improved Pneumatic Pump.

CORRESPONDENCE.—Running Water, Force and Energy.

MISCELLANY—About Slate-Improvements in the Iron—A Prussian Salt Mine—Cast Steel Rails—The Koh-i-Noor Diamond—Bessemer Steel Works at Home and Abroad—Novel Method of Catching Mice—Improved Method of Working Roasted Gold and Silver Ores in Pans and Barrels by Amalgamation.

MINING SUMMARY.—GOLD & SILVER: Nevada—California—Arizona—Idaho—Colorado—Montana—Oregon—COAL AND IRON: Nevada—North Carolina—COPPER: Michigan—Arizona—LEAD: Missouri—SLATE: Penusylvania.

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REVIEW OF THE IRON TRADE.

REVIEW OF THE COAL TRADE.

MINING AND OTHER STOCKS.

METAL MARKET.

PATENT LIST.

Etc., Etc., Etc.

NOTICE TO CORRESPONDENTS.

In consequence of a new regulation recently adopted by the Postmaster of this city to facilitate the early delivery of mail matter, we have to request our correspondents, in addressing us, to give the number of our post-office box, No. 5,969, in lieu of, or in connection with our business office address.

STORAGE AND TRANSPORTATION OF PETROLEUM.

On the first of February the law passed by the Parliament of Great Britain in 1868, regulating the storage of petroleum, goes into operation. It forbids the storage of any bituminous substance producing inflammable vapors at a temperature lower than 100° Fahrenheit, in any magazine within fifty yards of an inhabited building. This prohibition is found to be very inconvenient to merchants, but numerous deplorable disasters have proved that, in this instance, the public safety requires some interference on the part of the government with the ordinary freedom of trade.

The subject of the transportation of petroleum, on sea and land, is attended with similar difficulties. The importation of this article into Great Britain has become specially important, since its introduction has prevented a great rise in the price of tallow, consequent upon the devastations of the rinderpest among the cattle. Tallow has been from time immemorial the illuminating material of the poor man in Great Britain; and a scarcity and dearness of it would have put out the "farthing dip" in many a humble home. Petroleum now partly takes its place; and consequently, the unobstructed importation of petroleum is a matter of concern to the masses. Statesmen who raise the cry of a "free breakfast table" will also see the necessity of a cheerfully illumined supper table. Cheap light means evening study and domestic pleasure for the working man. Dear light means alehouse consolations, joyless homes, neglected families and intellectual stagnation.

It is natural and right, however, that emigrant and passenger ships and mail steamers should refuse to carry dangerous freights; and the marine transportation of petroleum must be confined to special classes of ships. Some of the English railway companies refuse to carry it, except on certain days and under certain restrictions. This system leads to its accumulation in vast quantities at provisional depots, and by increasing the time and risk of its transportation, adds to the price paid by the consumer.

The most important and radical measure of precaution is a thorough inspection of the petroleum. It is easy enough to produce an article that does not emit inflammable vapors at ordinary temperatures; but the interest of the manufacturer and the retailer is to adulterate refined petroleum with naphtha, gasoline and other products of distillation at low temperatures. The only remedies for this evil that we can apply in this country are, first, a strict inspection of all petroleum offered for sale or transportation; and a legal distinction to be established between the dangerous and the safe varieties. All petroleum not enduring the test of 100° should be classed with naphtha and gasoline. But this will be ineffective, *so long as the dangerous products are subject to a lighter tax than the properly refined kerosene*. A difference of this kind is a premium on adulteration.

Our advice to consumers is to test their kerosene for themselves, and refuse to pay for it if it does not prove safe. The test is easily made, by pouring a little water into a saucer, and adding a small quantity of petroleum, which will float upon the top. A lighted match being brought near the oil, if the flame should leap, as it were, to the latter, it would be a sign that inflammable vapors are given off by the liquid.

PROPER USE OF THE WORDS FORCE AND POWER.

In answer to remarks in a letter published elsewhere, we will state that it is by no means from "careless use of language," that we do not apply the word "force" to pounds simply, as unfortunately has been done, even in prominent works on mechanics. On the contrary, it is only after careful sifting of the subject that we have adopted the terms *weight*, *force* and *power*, to measure respectively: the first, a certain amount of matter; the second, the motion of that matter through a given space; and the third, the motion of this matter through the given space during a certain time. Our reasons for this have been fully explained in an article (page 377, vol. V. of this Journal,) which we recommend to the careful perusal of our correspondent, and since the publication of which we have always consistently adhered to the definitions of the words therein laid down.

We protest most of all against the common custom of expressing force simply in pounds, and this is exactly the great mistake which our correspondent wishes us to adopt. See to what it naturally leads. A scientific paper remarks, "The mechanical force developed by the change of one cubic inch of water into steam is nearly one ton." This statement is absolutely absurd, and still perfectly in accordance with the common language defended by our correspondent, to express force in pounds and nothing more. Now the statement should read: "The mechanical force, &c., is equal to one ton lifted one foot high." If our correspondent prefers to call the last mentioned result "energy," we do not object, although we do not like the word as well as "force," the latter being far more expressive of the true meaning; but we protest earnestly against calling a certain number of pounds alone "a force." In reality a number of pounds can express nothing more than the measure of a certain amount of matter, and as such they can exert a pressure, but nothing more; but *pressure is not force*, in the true, general acceptation of the word.

We are satisfied that this inconsistency of language has more than anything contributed to confusion of ideas, culminating in the search after perpetual motion, three quarters of the attempts to this impossibility being founded on the idea of producing motion by mere weight or pressure, without allowing the pressing weight or spring itself to move through any space.

An eminent Professor of Mechanics, in one of our first poly technic institutes, objects as we do, against the word "energy" for foot-pounds, but uses the word "power," and for a certain number of foot-pounds per minute, he uses the expression "work performed." We were formerly not averse to this rule; but considering that the term "horse-power" had come into universal acceptance, and would have to be abandoned for "horse-work," or some similar expression, we adopted finally the definitions as laid down page 377, vol. V. as the most consistent and satisfactory, when properly understood. They give the same accurate gradation which our correspondent desires, weight or pressure measuring mass, force the product of mass and space, power the product of mass, space and time.

THE COMSTOCK MINES.

The product of the Comstock mines for the year 1868 was $8,499,769, a falling off from the official figures of the year before of some $5,120,000. The dividends paid amount to $2,415,500, of which one company, the Savage, paid $1,184,000, and the Yellow Jacket and Crown Point, each $360,000, while the little Kentuck distributed the handsome sum of $480,000. The Imperial ($24,000) and the Gold Hill Quartz ($7,500) complete the list of dividend-paying mines. Even of these six mines the dividends do not represent clear profit; as the Yellow Jacket had an assessment of $150 000, the Imperial one of $100,000, the Gold Hill one of $10,000, and the Crown Point one of $90-000. Besides these there were fourteen other mines in which assessments were levied and various amounts of bullion, from zero to $885,076 (Chollar Potosi) produced, without profits enough to justify dividends. The total of assessments is $1,825,500 and the apparent net profits in the production of eight millions and a half of bullion is $590,000. The aggregate expense of the Comstock mines for the year appears to be a little over 93 per cent. of their aggregate production. This is a worse feature than the decrease of product, and indicates the necessity of some radical improvement—railroad or deep tunnel, or both.

ANSWERS TO CORRESPONDENTS.

☞ Correspondents are requested to sign name and address in full, as sometimes we may wish to write them by mail, when the answers they require are not of importance to our readers in general. In no case will the names thus enclosed be published, if a *nom de plume* is signed to the letter to indicate the writer's desire to remain unknown.

J. G., OF N. Y.—Asks: "What is the rule in relation to the employment of eccentrics and cranks? a given amount and motion and power being required, which is preferable? and in what case is one preferable to the other?" An eccentric is nothing but a crank, of which the crank-pin is so thick that its radius exceeds the distance from the centre of the crank-pin to the further side of the shaft; therefore, an eccentric, as it envelopes the shaft, may be applied at any part of it without dividing it. The leverage-action on the shaft is calculated from the distance of the centre of the eccentric or of the crank-pin from the centre of the shaft. The crank should be employed when a powerful reciprocating motion is to be converted into rotary, as in this case the eccentric, having too much surface, causes too much friction. However, when the crank-pin is too thin or too short, the other injurious extreme is produced, viz: too small a surface for the pressure of the power employed, and consequent heating of the journals is the result. The eccentric should be employed when a rotary motion is to be changed into a reciprocating one, which offers little resistance; or when it is necessary to make the length of stroke, or the relative position of one reciprocating motion to another, variable; with a simple crank (it being permanent) this cannot be accomplished. On this distinction are based the various uses of crank and eccentric in the steam engine.

W. E. B., OF PA.—The periphery of an ellipse is *not* found by adding together its major and minor diameters, dividing by two, and multiplying the product by 3.1415, etc. This is evident when considering an ellipse of one large and one very small diameter, say 199 inches, and 1 inch, which, after the above rule, would give 314.15 inches, as in reality the periphery would necessarily be a little larger than twice the larger diameter, or more than 2×199, or more than 398 inches. Your rule is entirely wrong. A convenient and accurate rule is this: The periphery of an ellipse is equal to twice the square root of the sum obtained by adding to the square of the major axis 1.4674 times the square of the minor axis. Tested by the extreme case above given, this rule gives as the periphery of the ellipse 398.5, which is evidently a close approximation. A third rule given in GRIER'S Mechanics' Calculator, "multiply the square root of half the sum of the squares of the two axes by 3.1416," is also inaccurate, as in the test case we have referred to it would make the periphery of the ellipse 443 inches, or more than the circumscribed rectangle. The rules given in various hand-books are often close enough for ordinary cases; but it is always well to test them by some extreme case, as we hav done above.

D. L. P., OF PA.—To polish raw wood, rubbing with a pretty thick solution of shellac in alcohol, as you propose, will not do, as you will certainly find out by trying it. The raw wood should first be well polished with fine sandpaper, oiled with linseed oil, and a (not too thick) solution of shellac in alcohol, should be put on with the brush, which is the American system; or the wood should be rubbed till dry with a rag, moistened with this solution and a few drops of oil. The last method is very laborious, and therefore most used in Europe, where labor is cheap. In either case, the surface, when dry, has to be polished again with very fine sandpaper, and then varnished again, and this process repeated several times. This is the way in which the high polish, so much admired on pianos and other superior kinds of furniture, is obtained.

J. B., OF PHILADELPHIA—Asks what is the brass composition at present used for engine bearings. It is in reality not brass but bell metal, as it contains only very little zinc, which may be left out altogether. A common prescription is 112 pounds copper, 12¼ tin, and 2 ounces of zinc. When it is desired that the bearings should be more tough than hard, it is 100 pounds of copper, 15 of tin and 15 of zinc; but manufacturers are not particular, in fact, not as much so as they ought to be, and their castings vary considerably. The last prescription gives a hard kind of brass.

A. R., OF N. Y.—Asks how to make thick linen, such as is used for the sails of vessels, water-tight, without depriving it of its flexibility. The common method is simply to paint it first with linseed oil alone, and then Spanish brown rubbed in linseed oil and turpentine. When this is dry, it may again be painted with a mixture of Spanish brown, lampblack, linseed oil and turpentine.

A. M. W., OF CONN.—To make paint dry quick, you cannot use Japan varnish, except when your paint is black or very dark in color. For light colored paints, use sulphate of zinc, zinc white, litharge, white lead, etc. Oil boiled with litharge is also good; but the best is the common so-called dryer, sold in most paint shops, which is a preparation of linseed oil, turpentine and oxide of lead.

J. S. M., OF ME.—We know that a hand-saw intended to saw iron is tempered much harder than one intended for sawing softer material, and therefore it is more liable to break.

F. A. C., OF N. H.—It is an error to believe that the penetrating power of a shot is greater at a distance than near the muzzle.

A PRUSSIAN SALT MINE.—Now that the accident at Wieliezka is threatening to destroy the largest salt mine in Europe, the Prussians are looking, successfully it would seem, for another to supply its place. Five leagues from Berlin, there is a little hill called Sperenberg, where gypsum had been got from time immemorial. As early as the days of Markgraf Joachim II., of Brandenburg, the popular rumor was current that salt was to be found underneath that gypsum. He commenced experiments, which, however, came to nothing, because the "skilled borer," whom he had obtained from abroad, ran away with the cash box, which disgusted the old monarch. In August, 1867, the matter was brought once more before the Government, and up to October of that year a depth of 283 ft. had been reached in the gypsum. On that day a momentous change appeared. Unmistakable symptoms of the salt made their appearance: but up to the 31st of August of next year, when a depth of 952 ft. had been reached, the salt stratum had not come to light, and the machinery then in use proving ineffectual for further labors, new and more powerful instruments had to be ordered. The work is now to recommence without a moment's delay, and to be pushed on with the utmost vigor. The existence of the salt is unquestionable. The only doubt remains as to whether the quantity will prove quite as large as anticipated.

Original Papers.

[TRANSLATED BY THE EDITOR.]

REGULATIONS OF THE ROYAL ACADEMY OF MINES AT BERLIN.

§ 1. *Object.* The Royal Academy of Mines at Berlin is established for the purpose of affording to those who would educate themselves in the management of mining, metallurgical or saline works opportunity to obtain the necessary professional knowledge.

§ 2. *Control and Administration.* The Academy is under the general control of a Director, appointed by the King, and responsible to the Minister of Commerce, Trade and Public Works. The financial and statistical departments (bureau work) are conducted by officials of the Ministerial Department of Mines, Furnaces and Salines.

§ 3. *The Curatorium.* This consists of five members or curators, appointed by the King, and assists in the arrangement of the organization, the determination of the various courses, and the nomination of instructors.

§ 4. *Duties of the Director.* Besides the regular management of the institution, the Director has the following special functions:

1. The issuance of permissions to enjoy the benefits of the Academy, according to the conditions in §§ 10 and 12.
2. The superintendence of the sytematic progress of lectures and instruction.
3. The control of collections and apparatus (for which the instructors in each branch are primarily responsible), and the preservation of buildings and personal property.
4. The preparation and transmission of estimates.
5. The procurement of apparatus, furniture, etc., and the receipt of moneys, within the limits of the estimates.
6. The transmission of annual accounts, and the reception and editing of notes and reports.
7. The rendition of annual reports.
8. The convocation of regular instructors, to consult upon the plan of instruction and other matters relating thereto, as often as may be required, and at least semi-annually.

§ 5. *Regular Instruction.* Regular instructors (Professors) are appointed by the Minister of Commerce, Trade and Public Works on the nomination of the Director, and approval of the Curatorium, for the principal subjects included in the course, and are bound to deliver certain lectures, and give certain instruction in their respective branches.

§ 6. *Extraordinary Instruction.* The Director may also, with the consent of the Curatorium, grant permission to any regular instructor of the Academy, to any professor or teacher of other institutions of learning, and to other duly qualified persons, to lecture upon special subjects.

§ 7. *General Plan of Instruction.* The lectures at the Academy continue from the 15th of October to the 15th of the following August, with an Easter vacation of three weeks.

§ 8. *Subjects.* The following subjects are included in the plan of regular instruction; Mines; Salines; General Metallurgy; Special Metallurgy, including the manufacture of iron and steel; Mechanics; Machines; Surveying, Drawing, Construction, Projections and Shadows; Recitations and Colloquies upon Mineralogy, Geognosy and Palaeontology; Ditte on Mathematical Processes; Mining Law; Mineral Chemistry; Iron Founding; Mechanical Technology of the Metals; Applied Chemistry in the Arts; Blow-pipe Assaying; General Chemical Analysis; with practical instruction in the Laboratory; Assaying in the dry and humid ways, theoretically and practically, etc. A catalogue of the lectures and lecture-fees is published semi-annually.

§ 9. *Reception of Students.* Permission to attend the Academy is granted by the Director, according to the conditions of § § 10 and 12, upon application made during the first fourteen days of the semester, and accompanied by the necessary attestations. This permission is endorsed upon the application, and given to the student by the registrar of the Academy.

§ 10. *Qualifications of Students.* The following have a right to be admitted to the Academy:

1. Those students of Mines, Furnaces, and Salines, who desire to devote themselves to the Prussian Government service.
2. The matriculated students of the Royal Frederick William University of Berlin.
3. The matriculated students of the Royal Academy of Practical Arts (Gewerbe Akademie).

§ 11. *Admission of other Students.* The director may also grant to other persons the permission to attend such lectures as they may name in their applications.

§ 12. *Applications.* The students admitted according to §§ 10 and 11, note, in the proper column of the application blank, the lectures which they desire to attend during the semester, and deliver it to the registrar for signature.

§ 13. *Fees.* Within four weeks after the beginning of the semester (half year) the applications (§ 12) are to be handed in, the fees paid into the academical treasury, and the students are to report themselves to the instructors.

§ 14. No instructor is allowed to accept the application of a student, or admit him to lectures and recitations before the fee has been paid, and receipt endorsed upon the application-blank, except where fees are remitted (§§ 19 and 20).

§ 15. *Fees.* Lectures and recitations are partly for fees (privatim) and partly gratuitous (publice).

16. In the case of private lectures included in the regular courses, the fee shall not exceed one thaler (73 cents, gold) for each weekly hour, per semester. The fee for a course of lectures occupying five hours of each week through the half year, for instance, would be five thalers. Fees for instruction in drawing and practice in the laboratory are subject to special arrangements.

§ 17. The fees for extraordinary lectures are fixed by the instructors in accordance with the Curatorium. The rule adopted for ordinary lectures is, in general, however, not to be exceeded.

§ 18. The fees paid in for extraordinary instruction are received by the respective instructors from the treasury at the end of the semester.

§ 19. *Remissions.* In cases of personal indigence, attested by the proper authorities, the Minister of Commerce, Trade and Public Works, may, on the application of the Director, remit to native students half the fees for ordinary instruction. There is no remission of the fees for special courses of lectures.

§ 20. The remission is endorsed by the Director on the application-blank; and the student binds himself thereupon, in writing, to refund to the treasury of the Academy the amount so remitted, within six years after leaving the institution.

§ 21. *Refunding Fees.* Fees are refunded to students when the lectures do not take place, or are broken off during the first part of the semester, or are held at different times from those first announced. The amounts so refunded must be drawn from the treasury during the first four months of the current semester, otherwise the claim is void.

§ 22. *Certificates.* Remarks as to the degree of industry and proficiency manifested by the students are entered at the close of the semester in the proper columns of the application blank. At the request of the student, the Director will issue, upon surrender of the application blank, a certificate as to his conduct and progress, while in attendance at the Academy.

Students who have attended the Academy for at least two semesters, may be subjected to an examination, and receive certificates of their attainments. With reference to this point the following rules are established:

REGULATIONS FOR THE EXAMINATIONS OF THE ROYAL ACADEMY OF MINES AT BERLIN.

§ 1. The students of the Royal Academy of Mines may, upon leaving the same, for the purpose of obtaining proof of their acquirements, undergo an examination, the result of which will be embodied in an official certificate, made out for them.

§ 2. Only those students can apply for such an examination who have attended the lectures or taken part in the practical exercises of the Academy for at least two semesters. Nothing more is necessary for admission to examination than proof of such attendance.

§ 3. The examination may cover all the sciences and accomplishments taught at the Academy. The candidates have to name those branches in which they desire to be examined.

§ 4. The commission conducting the examination consists of at least three members, including the Director of the Academy as President, and the instructors in those branches covered by the examination.

§ 5. The examination is both written and oral. The candidate must present, upon a subject named by the commission, a written thesis, for the preparation of which a period of six weeks is allowed him. If he is to be examined in several branches, he may choose the one to which the subject of the thesis shall belong. The candidate is also at liberty, however, to present besides this one obligatory work, other written productions or drawings. All work so presented is to be accompanied with the written assurance that it has been performed without assistance; and the thesis must be in the candidate's own handwriting.

§ 6. Applications for examination must be addressed in writing to the Director of the Academy at least six weeks before the close of the semester, and accompanied with the necessary proof of two semesters' attendance. The examining commission then determines the subject for the thesis, so that this may be prepared during the vacation. The completed work is to be handed in to the commission within the six weeks before mentioned, a discretionary prolongation of which period is only to be made by the commission in cases of extraordinary hindrance. The oral examination takes place at the beginning of the following semester.

§ 7. The examining commission prepares a diploma or certificate concerning the result of the oral examination of the written thesis. Three degrees of proficiency are recognized, and entered on diplomas, with the words, "*mit Auszeichnung*" (with distinction), "*gut*" (well) and "*genuegend*" (pretty well, or sufficiently). Each examiner proposes the verdict in his own department, and the question is determined, which grade of proficiency shall be certified, by a vote of a majority of the commission. For those branches, in which the candidate has not borne examination even "sufficiently" well, no entry whatever is made.

§ 8. The candidate is free to apply after the lapse of half a year, to be re-examined in those branches in which he failed on the first trial, but after a second failure no further application will be granted.

§ 9. The examination fee, payable to the academical treasury when the application is made, is ten thalers for an examination covering not more than four branches. For every additional branch an additional fee of three thalers is required; but the whole fee can in no case exceed twenty thalers.

The following are the regular courses of lectures for the winter semester of 1868–9.

Lectures and Instructors.	Half yearly fee.
1. Mining Technology—five lectures weekly, by Bergrath Hauchecorne	5 Thalers.
2. Technology of Salt Works—one lecture weekly, by Bergrath Hauchecorne	1 "
3. General Metallurgy—four lectures weekly, by Professor Kerl	4 "
4. Metallurgy of Iron—four lectures weekly, by Bergrath Wedding	4 "
5. Founding and Moulding—three lectures weekly, by Dr. Durre	4 "
6. Chemical Technology—two lectures weekly, by Professor Kerl	2 "
7. General Assaying—six lectures weekly, by Professor Kerl	9 "
8. Blow-pipe Assaying—two lectures weekly, by Professor Kerl	3 "
9. Assaying of Iron—three lectures weekly, by Bergrath Wedding	4 1-2 "
10. Petrography—four lectures weekly, by Professor Beyrich	4 "
11. Geology, with special attention to the Stratified Formations—four lectures weekly, by Professor Beyrich	4 "
12. The Geological Formation of the Globe—one lecture weekly, by Dr. Lossen	Gratis.
13. On Volcanoes—one lecture weekly, by Professor Roth	"
14. Mineralogical Repetitions—four lectures weekly, by Professor G. Rose	"
15. Mineralogical Exercises—four lectures weekly, by Dr. Eck	4 Thalers.
16. Chemistry of Minerals—three lectures weekly, by Professor Rammelsberg	Gratis.
17. Repetitions of Analysis of Minerals—four lectures weekly, by Dr. Finkener	"
18. Practical Instruction in the Analysis of Minerals—(a), quantitative; five hours daily, by Dr. Finkener	20 Thalers.
(b), qualitative; four hours weekly, by Dr. Finkener	8 "
19. Analytical Geometry—five lectures weekly, by Professor Bertram	5 "
20. Mechanical Science—six lectures weekly, by M. Horrman	6 "
21. Applied Mechanics—six lectures weekly, by M. Horrman	6
22. Surveying of Mines—four lectures weekly, by Berg-Assessor Kauth	4
23. Instruction in Drawing—eight lectures weekly, by Berg-Assessor Kauth	Gratis.
24. Laws of Mines—two lectures weekly, by Geh. Obergrath Ackenbach	"

Bergrath (Mining Councillor) Hauchecorne is the present Director of the Academy.

[WRITTEN FOR THE AMERICAN JOURNAL OF MINING.]

THE CHEMICAL OPERATIONS.

BY PROF. G. HINRICHS, OF THE IOWA STATE UNIVERSITY.

V.

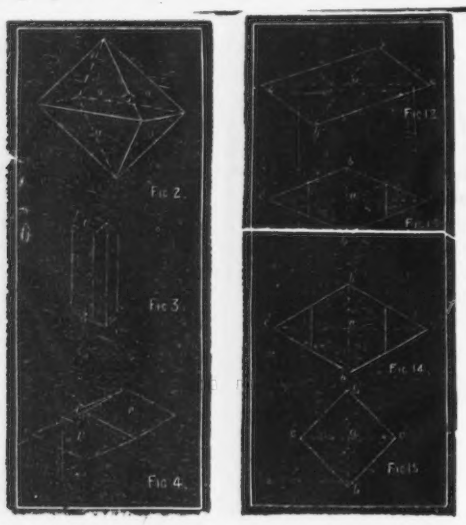
CRYSTALLIZATION CONTINUED.

37. The surface of all crystals is composed of planes, called faces; and these faces, when the crystal is perfectly developed, are arranged in pairs, every face having a mate, opposite and parallel to it. When a complete crystal is divided into two equal portions by a plane cut, the section must therefore be a figure bounded by straight lines; and the opposite side must be parallel. In all crystals there is one section which is particularly characteristic. A crystal being placed in such a position that the faces are symmetrically disposed around the vertical axis (Figs. 2, 3 and 4 are in this position), this most characteristic section will be horizontal.

38, The crystalline forms are classified according to the form of this horizontal section. The most general case is that in which the section is a parallelogram, that is, a four-sided figure, the opposite sides of which are parallel (Fig. 12); the figure here represented is also called a rhomboid. When all the sides are made of equal length, the rhomb, (Fig. 13) is the result. While in the rhomboid the diagonals or axes $b\,b'$, $c\,c'$ intersect each other obliquely, in the rhomb they cross at right angles. But the angle $c\,b\,c'$ of the rhomb may have any magnitude. If it is exactly 120°, then two additional faces, parallel to the axis $b\,b'$, will produce a six-sided figure or regular hexagon, (Fig. 12) all the angles

of which are equal (120°). Crystals which show this horizontal section are called hexagonal.

If the angle *c bc'* of the rhomb (Fig. 13) is 90° (a right angle) the rhomb becomes a square (Fig. 15), and crystals having this horizontal section are called quadratic. It is



evident that, if the vertical section is at the same time a square, the crystal will have the form of a cube, and such crystals are called cubical or tesseral.

When the angle in the rhomb (Fig. 13) is neither 90° nor 120°, the corresponding crystal is said to be rhombic.

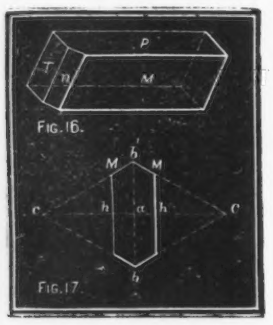
39. We have then the following classification of crystalline forms:

HORIZONTAL SECTION.	NAME OF CRYSTAL FORM.
I. A rhomboid,	Rhomboidal.
II. A rhomb,	
a. Neither 90° nor 120°,	Rhombic.
b. Exactly 120°,	Hexagonal.
c. Exactly 90°.	
c. 1. Vertical section not a square,	Quadratic.
c. 2. Vertical section a square,	Cubic.

40. These varieties of forms are usually called systems, and considered as radically different. But this view is contrary to mathematics and experience; since we know mathematically that there is an unbroken series of rhombic forms, in which the hexagonal and quadratic are only single special links. Experience confirms this view, by showing actual rhombic forms almost hexagonal or almost quadratic—often only differing a few minutes from either 120° or 90°; and we know moreover many rhombic crystals, the angles of which, when heated, approach more and more to the special values, 90° and 120°, corresponding to the quadratic and hexagonal forms.

There are likewise cases in which two substances, very similar to each other in other respects, and closely approaching each other in respect of form, are placed by systematists in two different systems. Thus, Chili saltpeter is hexagonal, having an angle of *exactly* 120°. The closely-allied common saltpeter, or niter, has an angle of 113°, and is therefore rhombic; but it would evidently be wrong to throw it far from the Chili saltpeter, into an entirely different *system*, for so small a deviation from 120°.

41. The following substances, which the student can procure in any drug-store, are easily crystallized, and represent all the five forms of crystalline bodies:



1. *Blue Vitriol* is rhomboidal, its horizontal section being a parallelogram or rhomboid (P., Fig. 16.) The inclination of the faces is, P to T, 127° 40′; T to M, 123° 10′; P to M, 109° 32′; and P to *n*, 120° 50′. Very beautiful and large crystals are easily obtained by slow evaporation, at ordinary temperatures.

2. *Nitre* is rhombic; the horizontal section (Fig. 17) of the vertical six-sided prism has the angles, M to M, 119°; M to *h*, 120° 30′. Very large and well defined crystals may be picked out from the nitre in any drug store.

3. *Chili Saltpeter* may be crystallized as before described. It is hexagonal, every angle of the six-sided horizontal section in the middle of the rhombohedron (Fig. 4) being exactly 120°.

4. *Yellow Prussiate of Pottassa* is quadratic, and crystallizes also quite readily. It can be had under this name in any drug-store, often in very good crystals.

5. *Alum* is the best example of the cubical form, and has been sufficiently described above.

42. To preserve these specimens for exhibition or reference, the larger ones may be stuck upon rectangular pieces of wood, bearing the proper label; and the smaller ones mounted on pins, the points of the latter being stuck in a disk of cork, and this in turn made fast with sealing-wax to the wooden pedestal.

Beeswax, fused with some Venetian turpentine is best adapted for fastening the specimens to the blocks or pins.

43. For further information concerning the form of crystals, we must refer to works on Crystallography which treat exclusively of this subject. The crystal form is one of the most fundamental properties of substances, and it is therefore impossible to neglect it altogether, as do most works on Chemistry, without leaving a logical gap in the treatment of the subject. I shall have occasion hereafter to describe some other modes of crystallization, and to refer frequently to the wonderful forms presented by the substances to be studied. If the student has not mastered the little that space has permitted me to say under these heads, he cannot be too earnestly requested to review the subject thoroughly before passing to the next topic.

Correspondence.

[To insure insertion of correspondence in our columns, the full name and address of the writer must be given.]

The following letter is reprinted from our last week's number, partly on account of several typographical errors in its first publication, and partly because one of the subjects to which it refers forms the subject of an editorial this week:

Running Water—Force and Energy.

NEW YORK, Jan. 26, 1869.

EDITOR AMERICAN JOURNAL OF MINING:

In answer to "D. & S., of Michigan, you say: "200 inches of water under four feet head is, when you mean cubic inches, equal to 8 pounds of water falling 4 feet, or a force of 32 foot pounds; 100 inches of water under 16 feet head, is equal to 4 pounds falling 16 feet, or a force of 64 foot-pounds—the second force is double the first."

The expression, "inches of water," generally refers to the area of outlet, and not to cubic inches; the quantity of water is proportional to the area, multiplied by the square root of the head: and the resulting energy, or capacity for performing work, is measured by the product of the quantity with the head. In the example above given, the quantities in the two cases are to each other as $200\sqrt{4}$ to $100\sqrt{16}$, or 1 to 1. The energies will therefore be as 1×4 to 1×16. That is to say, the quantity of water flowing through an outlet of twice the area, under one-quarter the head, is the same, but the *energy* is only one-fourth as great. Your answer, though strictly correct, is based upon the interpretation of "inches" as *cubic*, not square inches; and I am satisfied that in the problem, as stated to you, the word "inches" was intended in the ordinary sense in which it is employed by hydraulic engineers and by practical millers—viz., square inches of sectional or outlet area.

Allow me also to protest against the manner in which you employ the term "force." Uniformity of usage in such matters is extremely desirable; and I do not suppose that the AMERICAN JOURNAL OF MINING seeks to depart from the practice agreed upon by the best writers on mechanics. These authors (see for instance, "RANKINE's Applied Mechanics," pp. 514, 517, 593, 660, or *Prime Movers*, p. 72) do not apply the term force to foot-pounds. They express force in pounds, energy in foot-pounds, and power in foot-pounds per minute, thus maintaining a clear distinction among the different products of force, space and time. I know that the ordinary nomenclature is loose in this respect, and that frequently the terms in which science has attached different meanings are employed as synonomous; but it is not too much to ask that the editor of a prominent scientific Journal, to whom the scientific distinctions are familiar things, should not, by careless use of language, assist in perpetuating the confusion of ideas in Mechanics which pervades the popular mind and is quite sufficiently illustrated in the popular literature of the day.

A. F.

Manganese—Its use in the Arts.

BY DR. L. FEUCHTWANGER.

This mineral substance was known in ancient times under the name of "glassmaker's soap" and was considered a species of iron ore. In the year 1740 it was ascertained to be an oxide of a separate metal, and in 1774, Gahn obtained the pure metal from the native carbonate, exposing the same to intense heat for several hours, or by subjecting chloride of manganese to electrolysis. Boerhaave does not appear to have known the metal. In my English edition of 1753 he speaks of it in the following words: "Take the frit and set it in melting pots in a working furnace, adding in each pot a proper quantity of a blackish stone not unlike loadstone, and called manganese, which serves to purge off that greenish cast natural to all glass and to make it clear." Scheele, Bergman, Chevreul, Berthier, and Berzelius, have in modern times investigated the physical and chemical characters of manganese. The ore is widely distributed over our globe; it accompanies many iron ores, particularly the hematites, also the franklinite of New Jersey. It has been detected as a constituent of meteoric iron; in the ashes of most vegetable and many animal substances; is the coloring principle of many fossils in a dendritic form in the chalcedony which is called the "mocha stone," and in the same form on sand pebbles of which I found plenty in Stanislaus River in California. It also occurs combined with sulphur, carbonic acid, silica, water, and with many atomic proportions of oxygen, such as protoxide, sesquioxide, binoxide, manganic acid, and permanganic acid becoming thereby sometimes a base and sometimes an acid. The principal varieties of manganese found in nature are of the following descriptions:

1st. Hausmannite has the form of a four-sided pyramidal crystal, with hardness 5, and a specific gravity 4·7.

2d. Braunite is an anhydrous sesquioxide, crystallizes in an octahedron, is much harder than the last, and has a higher specific gravity.

3d. Psilomelane, generally called the compact gray oxide, occurs in botryoidal and stalactitic shapes.

4th. Manganite is a hydrous sesquioxide, crystallizes in right rhombic prisms.

5th. Pyrolusite, the most useful and abundant ore of manganese, derives its name from two Greek words signifying "fire" and "to wash," in allusion to its property of discharging the brown and green tints of glass; it crystallizes in small rectangular prisms, or is fibrous, radiated, and divergent, of iron black color and grayish streak, has a specific gravity of 4 94, and is composed of 37 per cent. oxygen and 63 per cent. manganese. This ore is generally called binoxide, deutoxide, or peroxide, is a good conductor of electricity, and strongly electro-negative in the voltaic circuit. When heated to redness it readily parts with its excess of oxygen, as it gives off one third of it. When heated with sulphuric acid one half of its oxygen escapes. Owing to this property it is more employed in the arts than any other oxide; it is called in trade the "black oxide of manganese." Its commercial value is dependent upon the proportion of oxygen which it contains in excess of that which is necessary to its existence as sesquioxide. A convenient method of estimating this excess of oxygen is founded upon the circumstance, that the black oxide of manganese is decomposed in the presence of oxalic acid and from sulphuric acid proto-sulphate of manganese is formed, and all the excess of oxygen reacts upon the oxalic acid and converts it into carbonic acid, which passes off with effervescence. If the mixture be weighed before the decomposition has been effected, and again after it has been completed, the loss will indicate the amount of carbonic acid; each equivalent of peroxide of manganese gives two equivalents or its own weight of carbonic acid.

Manganic acid, known under the name of chameleon mineral, is obtained artificially by fusing the peroxide of manganese with equal weights of caustic potash, which when dissolved in a small quantity of water has a green color, but when largely diluted becomes purple and ultimately claret color; for this property it has been employed for many years in the arts.

Permanganic acid is artificially obtained by mixing intimately four parts of finely-powdered peroxide of manganese with three and one half parts of chlorate of potash, while five parts of hydrate of potash are dissolved in a small quantity of water and added to the above mixture. The whole is evaporated and reduced to powder, then heated to dull redness for an hour in an earthen crucible, and when cold the mass is treated with water and filtered through a funnel plugged with asbestos; the solution after being neutralized with sulphuric acid yields on evaporation beautiful red acicular crystals of permanganate of potash. This preparation of later years has become an important vehicle for disinfection. Among the other native oxides of manganese may be mentioned the *mineral wad*, which is also very abundant, but not valuable enough to produce gas. It is amorphous, soft, black, or brown and purple; when mixed with linseed oil it produces spontaneous combustion. It is supposed to be the coloring ingredient of the dendritic delineations upon many substances, such as steatite and others mentioned elsewhere. The localities of manganese are very prolific; pyrolusite has been mined very extensively in Europe; psilomelan in England, France, Belgium, and the United States; manganite in Bohemia, Saxony and England. Much of the latter is consumed in the bleacheries of those countries. The United States and the Provinces have inexhaustible deposits of the oxides of manganese. From Vermont, the eastern limit, to Georgia, the southern limit, large supplies were formerly furnished, but in late years West Virginia, North Carolina and California have supplied us to a large extent, but not of a high grade of oxidation. While the binoxide of manganese suitable for the manufactures ought to yield from 80 to 90 per cent. of oxygen gas, the product of the last mentioned States has not exceeded 50 to 70 per cent. oxygen. The provinces of New Brunswick and Nova Scotia have produced within a few years very superior oxides of manganese, and the specimens I possess in my cabinet excel in richness and beauty those from Ilmuran in Thuringen and Ihlefeld in the Hartz mountains of days gone by. The manufacturers of bleaching powders in England have for the last twenty years been supplied by the little principality of Nassau to the amount 50,000 tons per annum, while the United States with all its inexhaustible resources has not exported any, and it is hoped that before long the export of manganese may prove lucrative. The quality of the Nova Scotia manganese is, according to Howe, of high percentage, some from 82·4 to 89·8 of sesquioxide, and that from Tennycape as high as 97·04. The International manganese mine of New Brunswick contains from 80 to 85 per cent. of sesquioxide. We find manganese in the State of Missouri containing much cobalt, while the Vermont manganese is associated with much iron. We also find in California, in the red hill of the bay facing the city of San Francisco, containing millions of tons of psilomelane or compact manganese yielding from 40 to 50 per cent. sesquioxide. We also know manganese to be abundant in Canada. A vein of 50 to 60 feet wide is said to exist at Bachawanning Bay on Lake Superior.

The geological position of manganese is not quite accurately known. In Germany it traverses porphyry, and is associated with calcspar and baryta. In Vermont, in the United States, it is found among crystalline rocks; in Canada it is accompanied by dolomite, and in Nova Scotia it exists in a gray limestone, quartzite and conglomerite, and unquestionably belongs to the new red sandstone formation. My manganese mines at Pembroke are

situated close to the gypsum deposits, which would range them with the upper silurian system.

I will now enumerate the many useful applications in the arts.

1st. Manganese is employed for producing oxygen gas in the chemical laboratory, the material of the compound blowpipe and drummond light, for the production of alkaline manganate in order to procure a good and cheap light in combination with coal gas.

2d. Manganese is most extensively used in the manufacture of chlorine, so as to prepare a bleaching liquid or powder, the consumption of which by the paper and cotton manufacturers is unlimited.

3d. Next in importance is the manganese largely employed in the green flint glass works in precipitating the iron, and when added in excess to produce an amethyst color in flint glass.

4th. Steel manufacturers require manganese for producing a hard and tough product; a half pound to fifty of iron will have the effect.

5th. Linseed oil is rendered more siccative by the addition of manganese, and is called a patent dryer for paints and varnishes.

6th. A permanent black on earthenware and pottery is obtained by exposure to heat.

7th. A black enamel used in ornaments by jewelers is likewise produced with manganese.

8th. The manufacture of permanganates, a powerful disinfectant, and the main material in the new oxygen light is obtained from the same.

9th. The quality of spirits, with or without distillation, is obtained by the use of maganese.

10th. The chameleon mineral used in sugar refining is prepared with manganese.

The consumption of manganese for the manufacture of the new gas light about to be introduced in this country, forms a new epoch in this direction. It is to be converted first into the alkaline manganate, which acting as a sponge alternately absorbing the oxygen of the air and again releasing it, must require, if successful, a large amount of manganese annually. I gather the following particulars from the programme issued by the inventors, Messrs. Tessie de Motay and Marechal, of Metz: "The manganates are decomposed at a temperature of 600 deg. Fah., by the action of a jet of ordinary steam which liberates the oxygen and leaves a residuum composed of sesquioxide of manganese and the alkaline base contained in the combination. The manganate is regenerated by submitting the above mentioned solid residue to the action of a current of air at the same temperature as used in the decomposition, and all these operations are conducted in a series of retorts placed in a furnace where the manganates, after being raised to a temperature of 600 deg. Fah., are alternately submitted to the action of a jet of steam and current of air which restores to the mass the oxygen it has lost. The oxygen is disengaged by the steam from retorts; this steam is liquified by pressing into a condenser, and the pure oxide is collected into a gasometer. When applied for the production of light, oxygen in combination with common coal gas permits a reduction in the consumption of the latter, but at the same time giving an equal quantity of light, in the proportion of 16 to 1."

The permanganate of potash or Condy's disinfectant is recommended as a powerful agent in obtaining pure drinking water and in epidemic diseases. But by far the largest amount of manganese is consumed by the manufacturer of bleaching powders. England alone consumes 80,000 tons for that purpose per annum, and as soon as the United States becomes independent of the English imported chloride of lime for bleaching the cottons and the papers, not less than one-half million tons will be consumed for the desired object, for on examining the report of the director of the bureau of statistics, I find that 12,682 tons of bleaching powder have been imported the first five months of the year, at the value of $324,066.

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Patent List.

Interesting to Miners, Millmen, Metallurgists, Oil-Men, and Others.

86,145.—LINING FOR MOULDS FOR CASTING METALS.—John Farrar, Providence, R. I., and F. L. Whiting, Boston, Mass.

86,167.—PROCESS AND APPARATUS FOR SEPARATING MAGNETIC FROM NON-MAGNETIC SUBSTANCES.—Francis Alexandre Hubert La Rue and Octave Audet (assignors to F. A. H. La Rue and C. E. Panety, Quebec, Canada.

86,202.—MANUFACTURE OF STEEL.—Hayden M. Baker, Washington, D. C.

86,247.—INTRODUCING OXYGEN GAS INTO FURNACES, RETORTS, CONVERTERS, ETC.—O. M. Phillips, New York City.

86,248.—MANUFACTURE OF OXYGEN GAS.—O. M. Phillips, New York City.

86,240.—ORE WASHER AND SEPARATOR.—Julio H. Rae, Syracuse, N. Y.

86,303.—MANUFACTURE OF IRON AND STEEL BY THE BESSEMER OR PNEUMATIC PROCESS.—Alexander Lyman Holley, Swatara township, Pa.

86,304.—APPARATUS FOR THE MANUFACTURE OF IRON AND STEEL.—Alexander L. Holley and John B. Pearse, Swatara township, Pa.

The Koh-i-Noor Diamond.

The Koh-i noor has hitherto been a fatal jewel. May its recent recutting have broken the spell! Its history is well authenticated at every step. This stone of fate seems never to have been lost sight of from the days when Alaud-deen took it from the Rajahs of Malwa, five centuries and a half ago, to the day when it became a crown-jewel or England. Tradition carries back its existence in the memory of India to the year 57, B. C.; and a still wilder legend would fain recognize in it a diamond first discovered near Masulipatam, in the bed of the Godavery, five thousand years ago.

The Koh-i-noor is reported by Baber, the founder of the Mogul Empire, to have come into the Delhi treasury from the conquest of Malwa, in 1304. The Hindoos trace the curses and the ultimate ruin inevitably brought upon its successive possessors by the genius of this fateful jewel ever since it was first wrested from the line of Vikramaditya.

If we glance over its history since 1304, its malevolent influence far excels that of the necklace for which Friphyle betroyed her husband, or the Eguus Scianus of Greek and Roman tradition. First falls the vigorous Patan, then the mighty Mogul Empire, and, with vastly accelerated ruin, the power of Nadir, of the Doorance dynasty, and of the Sikh.

Runjeet Singh, when it was in his possession, was so convinced of the truth of this belief, that being satisfied with the enjoyment of it during his own lifetime, he sought to break through the ordinance of fate and the consequent destruction of his family by bequeathing the stone to the shrine of Juggernaut, for the good of his soul and the preservation of his dynasty. His successors would not give up the baleful treasure, and the last Maharajah is now a private gentleman.

In 1850, in the name of the East India Company (since, in its turn, defunct), Lord Dalhousie presented the Koh-i-noor to Queen Victoria.

Perhaps we should have been better without it. The Brahmins will hardly relinquish their faith in the malignant powers possessed by this stone, when they think of the speedily following Russian war, which annihilated the prestige of the British army, and the Sepoy mutiny three years later, which caused England's existence as a nation to hang for months on the forbearance of one man.

The public saw the Koh-i-noor lustreless at the exhibition of 1851, then weighing one hundred and eighty-six carats. Its re-cutting, performed in 1862, though executed with the utmost skill and perfection, has deprived the stone of all its historical and mineralogical interest. As a specimen of a gigantic diamond, whose native weight and form had been interferred with as little as possible (for with Hindoo lapidaries the grand object is the preservation of weight) it stood without a rival, save the Orloff, in Europe.

As it is, in the place of the most ancient gem in the history of the world—older even than the Tables of the Law and the Breastplate of Aaron, supposing them still to exist—we get, according to Mr King, a bad-shaped, because too shallow, modern brilliant, a mere lady's bauble, but of second-rate water, for it has a grayish tinge, and, besides, inferior in weight to several, being now reduced to one hundred and two carats and a half.

The operation of recutting was performed in London, under the care of the Messrs. Garbard's, the Queen's jewelers, who erected for that purpose a small four-horse steam engine on their premises. It was conducted by Voorsanger and another skillful workman sent over by M. Coster, from Amsterdam.

In consequence of the advantage gained by using steam power, the actual cutting occupied no more than thirty-eight working days—a striking contrast to the two years necessary for cutting the Pit diamond by the old hand process. In some parts of the work, as when it was necessary to grind out a deep flaw, the wheel made three thousand revolutions per minute.—*All the Year Round.*

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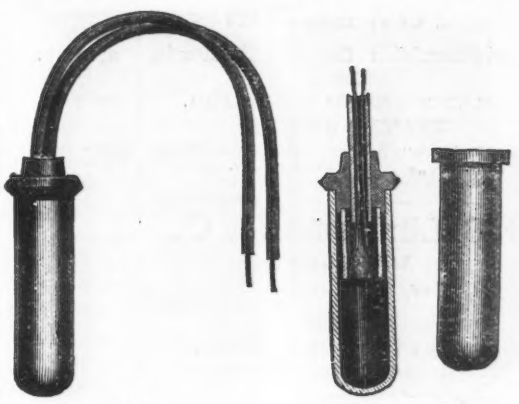

FIG. 1. FIG. 2. FIG. 3.

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FIG. 1 is a perspective view, and Fig. 2 a vertical section, showing the internal construction. Fig. 3, shown in the accompanying cut, is to be used with

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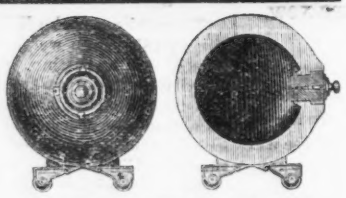

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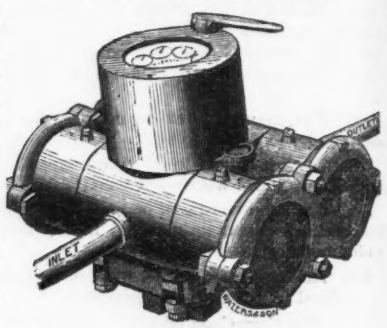

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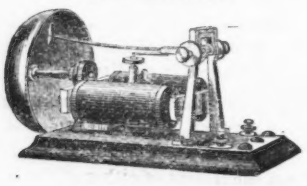

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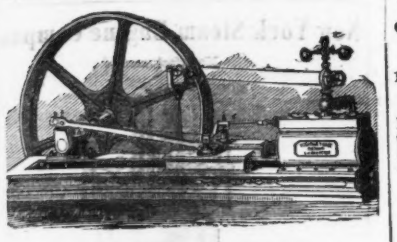

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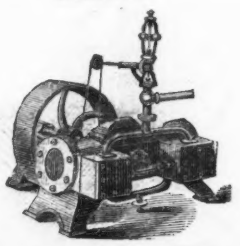

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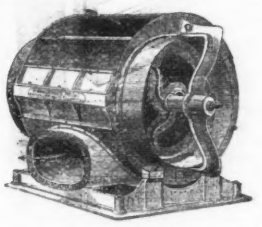

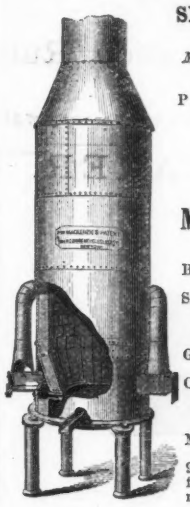

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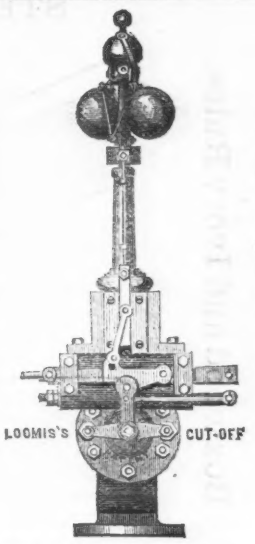

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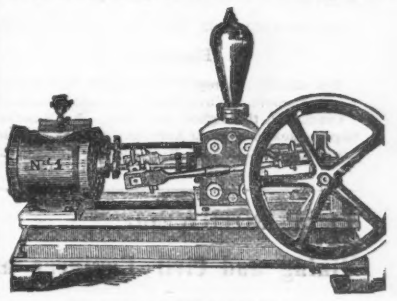

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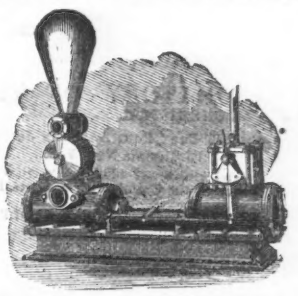

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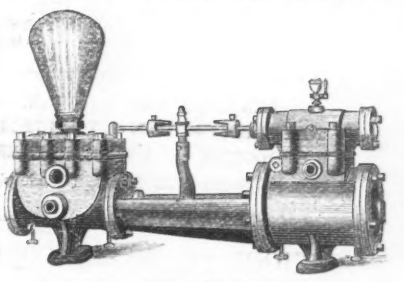

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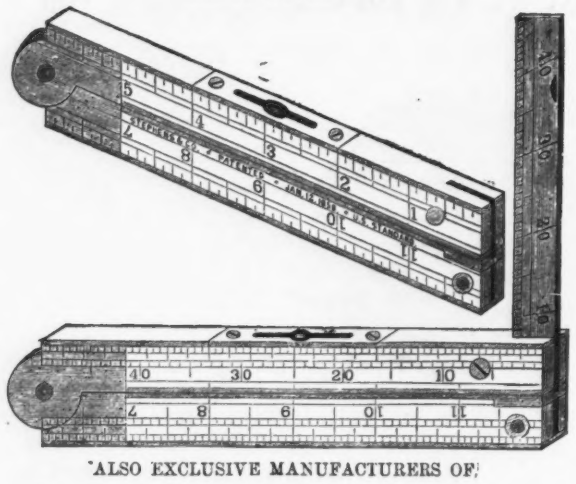

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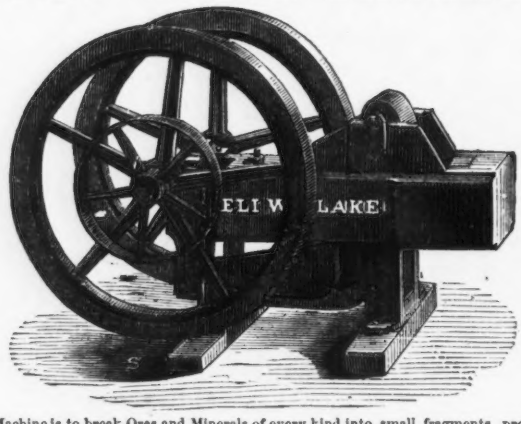

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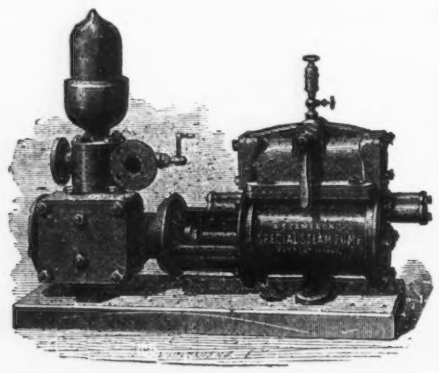

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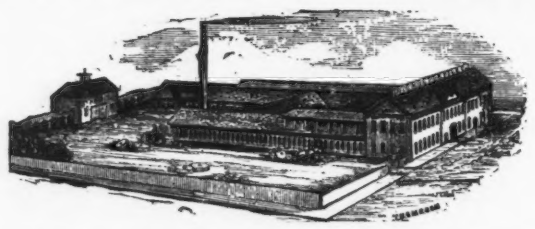

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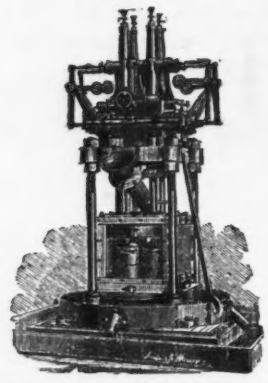

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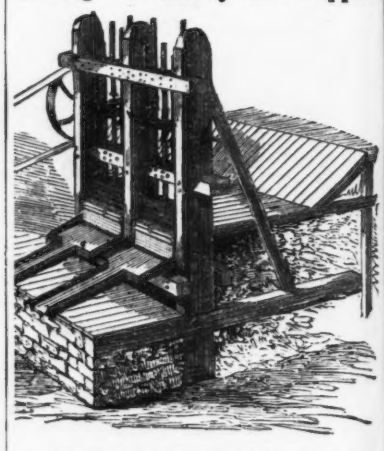

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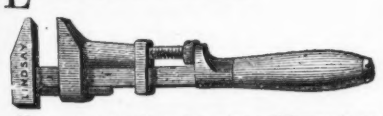

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